Test 1

Total mark 5

1 Choose the correct answer : (3 marks)

1 $\sqrt{(-8)^2}$ = ...

ⓐ -8 ⓑ 8 ⓒ ± 8 ⓓ 16

2 If $3a = \sqrt{4}\,b$, then $\frac{a}{b}$ = ...

ⓐ $3:2$ ⓑ $2:3$ ⓒ $4:3$ ⓓ $3:4$

3 The standard form of the rational number 0.00000072 is .....

ⓐ 7.2×10^{-6} ⓑ 7.2×10^{7} ⓒ 2.7×10^{-7} ⓓ 7.2×10^{-7}

2 If ΔXYZ , if $(XY)^2 = 100$ cm^2 , $(YZ)^2 = 121$ cm^2 , then find $XY + YZ$ (2 marks)

Test 2

Total mark 5

1 Choose the correct answer : (3 marks)

1 $\sqrt{(-8)^2 + (-6)^2}$ = ...

ⓐ $|-10|$ ⓑ ± 10 ⓒ 14 ⓓ -14

2 Which of the following is the greatest ?

ⓐ 2.3×10^4 ⓑ 2.3×10^5 ⓒ 3.2×10^4 ⓓ 3.2×10^5

3 The side length of the square whose area $9x^2$ cm^2 equals ..... cm. where $x > 0$

ⓐ $3x$ ⓑ $3x^2$ ⓒ $9x$ ⓓ $9x^2$

2 Find the result of : $(5.4 \times 10^4) + (3.7 \times 10^5)$ in the standard form. (2 marks)

Test 3

Total mark 5

1 Choose the correct answer : (3 marks)

1 The multiplicative inverse of $\sqrt{\frac{9}{16}}$ is .....

ⓐ $\frac{-4}{3}$ ⓑ $\frac{-3}{4}$ ⓒ $\frac{3}{4}$ ⓓ $\frac{4}{3}$

2 Which of the following numbers is in the standard form ?

ⓐ 11×10^{8} ⓑ 9.7×10^{-5} ⓒ 10.3×10^{-3} ⓓ 0.87×10^{8}

3 If $X = 0.0009$, then $\sqrt{X}$ = ...

ⓐ 0.0003 ⓑ 0.0081 ⓒ 0.003 ⓓ 0.03

2 The area of a square is equal to the area of a triangle with base = 9 cm. long and its height = 8 cm. Find the side length of the square. (2 marks)

Test 4

Total mark 5

1 Choose the correct answer : (3 marks)

1 If $0.00052 = 5.2 \times 10^{m}$, then m = ...

ⓐ 5 ⓑ 4 ⓒ – 4 ⓓ – 5

2 $\sqrt{6\frac{1}{4}}$ = ...

ⓐ $2\frac{1}{2}$ ⓑ $\frac{2}{5}$ ⓒ $\frac{3}{2}$ ⓓ $\frac{2}{3}$

3 The sum of the two square roots of the number 49 is .....

ⓐ 7 ⓑ 14 ⓒ – 14 ⓓ 0

2 [a] Find the result of : 60000×5000 in the standard form. (2 marks)

[b] Simplify to the simplest form : $\left(\frac{-2}{3}\right)^{2} - \sqrt{\frac{16}{81}} + \left(\frac{1}{2}\right)^{\text{zero}}$

Test 5

Total mark 5

1 Choose the correct answer : (3 marks)

1 The standard form of the number 5 millions is .....

ⓐ 5×10^5 ⓑ 5×10^6 ⓒ 5×10^7 ⓓ 5×10^4

2 If $x^{-1} = 4$, then $\sqrt{x} =$ .....

ⓐ $-\frac{1}{2}$ ⓑ $\frac{1}{2}$ ⓒ $\pm\frac{1}{2}$ ⓓ ± 2

3 The additive inverse of the number $\sqrt{\frac{4}{25}}$ is .....

ⓐ $\frac{-2}{5}$ ⓑ $\frac{5}{2}$ ⓒ $\frac{2}{5}$ ⓓ $\frac{-5}{2}$

---

2 [a] Find the result of : $(3.8 \times 10^8) \div (1.8 \times 10^6)$ in standard form. (2 marks)

[b] Simplify to the simplest form : $\left(\frac{-3}{7}\right)^0 \times \left(\frac{-2}{5}\right)^2 \times \sqrt{6\frac{1}{4}}$

Test 1

Total mark 5

1 Choose the correct answer : (3 marks)

1 The parallelogram with two adjacent sides are equal in length is called .....

(a) square. (b) rhombus.

(c) rectangle. (d) trapezium.

2 If the measure of two angles in a triangle are 35° and 55° , then the triangle is .....

(a) obtuse-angled. (b) right-angled.

(c) acute-angled. (d) equilateral.

3 The ray drawn from the midpoint of a side of a triangle parallel to another side ..... the side.

(a) is parallel to (b) is congruent to

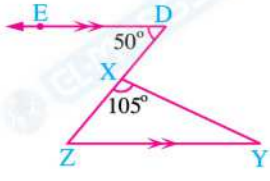
(c) bisects (d) is perpendicular to

2 In the opposite figure : (2 marks)

$\overrightarrow{DE} // \overline{YZ}$, m (∠ ZDE) = 50°

, m (∠ YXZ) = 105°

Find : m (∠ Z) , m (∠ Y) and m (∠ YXD)



Test 2

Total mark 5

1 Choose the correct answer : (3 marks)

1 The parallelogram whose diagonals are perpendicular and not equal in length is called .....

(a) rhombus. (b) square.

(c) rectangle. (d) trapezium.

2 ABC is a triangle in which m (∠ A) = m (∠ B) = 50° , then m (∠ C) = ...

(a) 30° (b) 50°

(c) 80° (d) 100°

3 If ABCD is a square , then m (∠ CAB) = ...°

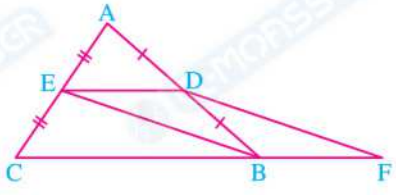
(a) 30° (b) 45°

(c) 60° (d) 90°

2 In the opposite figure : (2 marks)

D and E are the midpoints of $\overline{AB}$ and $\overline{AC}$ respectively , $F \in \overrightarrow{CB}$ where $BF = \frac{1}{2} BC$

Prove that : BEDF is a parallelogram.



Test 3

Total mark 5

1 Choose the correct answer : (3 marks)

1 The sum of measures of the interior angles of a triangle equals the measure of ..... angle.

ⓐ right ⓑ straight

ⓒ acute ⓓ reflex

2 The rectangle whose two diagonals are perpendicular is called .....

ⓐ rhombus. ⓑ trapezium.

ⓒ square. ⓓ rectangle.

3 The measure of the exterior angle of a triangle ..... the sum of the measures of its non adjacent interior angles.

ⓐ > ⓑ <

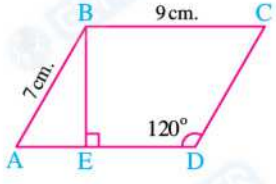
ⓒ ≠ ⓓ =

2 In the opposite figure : (2 marks)

ABCD is a parallelogram in which :

m (∠ ADC) = 120° , $\overline{BE} \perp \overline{AD}$

, AB = 7 cm. , BC = 9 cm.



Find by proof : 1 m (∠ C)

2 m (∠ ABE)

3 The perimeter of the parallelogram ABCD

Test 4

Total mark 5

1 Choose the correct answer : (3 marks)

1 In Δ ABC : if m (∠ A) > m (∠ B) + m (∠ C) , then the angle A is .....

ⓐ acute. ⓑ right.

ⓒ obtuse. ⓓ straight.

2 ABCD is a parallelogram in which m (∠ A) + m (∠ C) = 160°

, then m (∠ B) = ...

ⓐ 80° ⓑ 50°

ⓒ 100° ⓓ 120°

3 The square is a ..... with a right angle.

ⓐ rectangle ⓑ rhombus

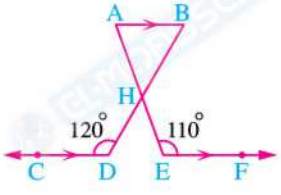
ⓒ parallelogram ⓓ trapezium

2 In the opposite figure : (2 marks)

$\overline{AB} // \overrightarrow{DC} // \overrightarrow{EF}$, $\overline{BD} \cap \overline{AE} = \{H\}$

, m (∠ E) = 110°

, m (∠ D) = 120°



Find with proof : m (∠ EHD)

Test 5

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 The rectangle whose two diagonals are perpendicular is called .....

(a) square. (b) rhombus.

(c) rectangle. (d) trapezium.

2 In Δ ABC : if m (∠ B) = 2 m (∠ C) = 60° , then the triangle is ..... triangle.

(a) acute-angled (b) equilateral

(c) obtuse-angled (d) right-angled

3 If ABCD is a rhombus in which m (∠ ACB) = 32° , then m (∠ D) = ...

(a) 32° (b) 64°

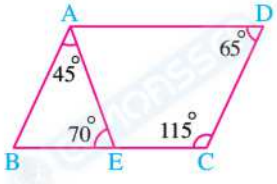
(c) 116° (d) 26°

2 In the opposite figure : (2 marks)

m (∠ BAE) = 45° , m (∠ AEB) = 70°

, m (∠ D) = 65° , m (∠ C) = 115°

Prove that : ABCD is a parallelogram.



Answers of Test 1

1 1 (b) 2 (b) 3 (d)

2 $\because (XY)^2 = 100\ cm^2$ $\therefore XY = \sqrt{100} = 10$ cm.

, $\because (YZ)^2 = 121\ cm^2$ $\therefore YZ = \sqrt{121} = 11$ cm.

$\therefore XY + YZ = 10 + 11 = 21$ cm.

Answers of Test 2

1 1 (a) 2 (d) 3 (a)

2 The expression $= 10^4 (5.4 + 3.7 \times 10) = 10^4 (5.4 + 37) = 42.4 \times 10^4 = 4.24 \times 10^5$

Answers of Test 3

1 1 (d) 2 (b) 3 (d)

2 $\because$ The area of the triangle $= \frac{1}{2} \times 8 \times 9 = 36\ cm^2$ $\therefore$ The area of the square $= 36\ cm^2$

$\therefore$ The side length of the square $= \sqrt{36} = 6$ cm.

Answers of Test 4

1 1 (c) 2 (a) 3 (d)

2 [a] $60000 \times 5000 = 300\,000\,000 = 3 \times 10^8$

[b] $\left(\frac{-2}{3}\right)^2 - \sqrt{\frac{16}{81}} + \left(\frac{1}{2}\right)^0 = \frac{4}{9} - \frac{4}{9} + 1 = 1$

Answers of Test 5

1 1 (b) 2 (b) 3 (a)

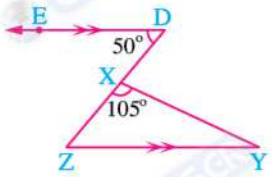
2 [a] The expression $= \frac{3.8}{1.9} \times \frac{10^8}{10^6} = 2 \times 10^2$

[b] $\left(\frac{-3}{7}\right)^0 \times \left(\frac{-2}{5}\right)^2 \times \sqrt{\frac{25}{4}} = 1 \times \frac{4}{25} \times \frac{5}{2} = \frac{2}{5}$

Answers of Test 1

1 1 (b) 2 (b) 3 (c)

2 ∵ $\overrightarrow{DE}$ // $\overline{YZ}$, $\overleftrightarrow{DZ}$ is a transversal to them



∴ m (∠ D) = m (∠ Z) = 50° (alternate angles)

∵ The sum of the measures of the interior angles of the triangle = 180°

∴ m (∠ Y) = 180° – (105° + 50°) = 25°

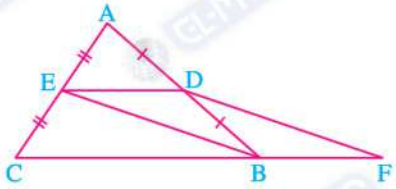
, ∵ ∠ YXD is an exterior angle of Δ XYZ

∴ m (∠ YXD) = 50° + 25° = 75° (The req.)

Answers of Test 2

1 1 (a) 2 (c) 3 (b)

2 In Δ ABC :



∵ D is the midpoint of $\overline{AB}$, E is the midpoint of $\overline{AC}$

∴ $\overline{DE}$ // $\overline{BC}$

, ∵ F ∈ $\overrightarrow{CB}$

∴ $\overline{DE}$ // $\overline{BF}$ (1)

, ∵ $DE = \frac{1}{2} BC$, $BF = \frac{1}{2} BC$

∴ DE = BF (2)

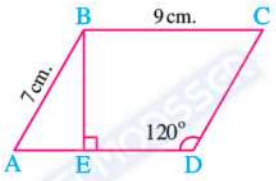
From (1) and (2) :

∴ BEDF is a parallelogram. (Q.E.D.)

Answers of Test 3

1 1 (b) 2 (c) 3 (d)

2 ∵ ABCD is a parallelogram



∴ m (∠ C) + m (∠ D) = 180°

∴ m (∠ C) = 180° – 120° = 60° (First req.)

∵ m (∠ A) = m (∠ C) = 60°

, In Δ ABE : m (∠ ABE) = 180° – (90° + 60°) = 30° (Second req.)

, the perimeter of the parallelogram ABCD = (9 + 7) × 2 = 32 cm. (Third req.)

Answers of Test 4

1 1 (c) 2 (c) 3 (b)

2 $\because \overline{AB} // \overrightarrow{DC}$, $\overline{BD}$ is a transversal to them.

$\therefore m(\angle B) + m(\angle D) = 180°$

(Two interior angles in the same side of the transversal)

$\therefore m(\angle B) = 180° - 120° = 60°$

, $\because \overline{AB} // \overrightarrow{EF}$, $\overline{AE}$ is a transversal to them.

$\therefore m(\angle A) + m(\angle E) = 180°$

(Two interior angles in the same side of the transversal)

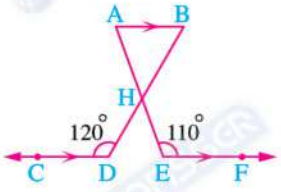
$\therefore m(\angle A) = 180° - 110° = 70°$

$\therefore$ In Δ BHA :

$m(\angle BHA) = 180° - (60° + 70°) = 50°$

$\because \overline{BD} \cap \overline{AE} = \{H\}$

$\therefore m(\angle EHD) = m(\angle BHA) = 50°$ (V.O.A) (The req.)



Answers of Test 5

1 1 (a) 2 (d) 3 (c)

2 In Δ ABE : $m(\angle B) = 180° - (45° + 70°) = 65°$

, $\because m(\angle D) + m(\angle C) = 65° + 115° = 180°$

and they are interior angles in the same side of the transversal

$\therefore \overline{AD} // \overline{BC}$ (1)

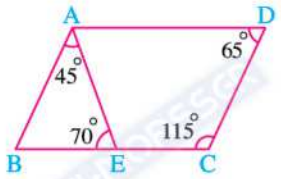
, $\because m(\angle B) + m(\angle C) = 65° + 115° = 180°$

and they are interior angles in the same side of the transversal

$\therefore \overline{AB} // \overline{CD}$ (2)

, from (1) and (2) :

$\therefore$ ABCD is a parallelogram. (Q.E.D.)



10 Marks

Model (1)

1 Choose the correct answer: (3)

a $3x^{-1} =$ ....., $x \neq 0$

1 $-3x$ 2 $\frac{3}{x}$ 3 $3x$ 4 $\frac{1}{3x}$

b $6{,}000 \times 50 =$ .....

1 300×10^2 2 30×10^5 3 -3×10^3 4 3×10^5

c $\left(\frac{-2}{3}\right)^{-3} =$ .....

1 $\frac{27}{8}$ 2 $\frac{-8}{27}$ 3 $\frac{8}{27}$ 4 $\frac{-27}{8}$

2 Complete each of the following: (3)

a $3 \times 2 - 16 \div 8 =$ .....

b The multiplicative inverse of $(3)^{-2}$ is .....

c If $0.0000056 = 5.6 \times 10^x$, then $x =$ .....

3 Simplify: (2)

$$\frac{(-3)^6 \times (3)^{-3}}{(3)^5 \times (3)^{-4}}$$

.....

.....

4 Find the result of the following in standard form: (2)

$(2.9 \times 10^4) + (4.2 \times 10^5)$

.....

.....

10 Marks

Model (2)

1 Choose the correct answer:

3

a $\left(\frac{1}{3}\right)^{-2} =$ .....

1 $\frac{1}{9}$ **2** -9 **3** $\frac{-1}{9}$ **4** 9

b $0.0000073 = 7.3 \times$ .....

1 10^{-6} **2** 10^{5} **3** 10^{-5} **4** 10^{6}

c $2^{-8} \times 2^{-8} = 2^{m}$, then m = ...

1 -16 **2** -9 **3** -7 **4** zero

2 Complete each of the following:

3

a If $x = 7^{-3}$, $y = 7^{3}$, then xy = ...

b The standard form of the number 0.7×0.005 = ...

c $2 \times 6 - 4 \div 2 + 1$ = ...

3 Simplify:

2

$\frac{x^{3} \times x^{-2}}{x^{-5} \times x}$ When $x \neq 0$, then find the value when $x = -2$

.....

.....

4 Find the value of:

2

$12 + (9 - 2) \times 3^{2}$

.....

.....

10 Marks

Model (3)

1 Choose the correct answer: (3)

a $\frac{6a^2x^4}{2a^3x^3}$ = ... where $a \neq 0, x \neq 0$

1 $3ax^2$ **2** $3a^5x^7$ **3** $\frac{3x}{a}$ **4** $\frac{3}{ax}$

b The number ..... is in standard form.

1 12×10^4 **2** 3.9×10^{-3} **3** 14.1×10^{-4} **4** 0.38×10^6

c $10 \times 4 - (2 \times 6 - 8)$ = ...

1 zero **2** 80 **3** 36 **4** 1

2 Complete each of the following: (3)

a $\left(\frac{1}{2}\right)^{-1}$ = ...

b The number 0.00053 in the scientific notation is .....

c $(8 - 6 \div 2)^2 + 3 \times 4$ = ...

3 Find the value of: (2)

$\left(\frac{9^3 \times 9}{9^5}\right)^{-3}$

.....

.....

4 Write the following number in the standard form: (2)

581200000000 = ...

10 Marks

Model (4)

1 Choose the correct answer: (3)

a $x^6 \div x^{-2} =$ ..... where $x \neq 0$

1 x^3 **2** x^4 **3** x^{12} **4** x^8

b $23800000 = 2.38 \times$ .....

1 10^7 **2** 10^{-7} **3** 10^6 **4** 10^{-6}

c $(2)^{-3}$ ..... $(-2)^3$

1 $>$ **2** $<$ **3** $=$ **4** $\leq$

2 Complete each of the following: (3)

a If $\left(\frac{4}{9}\right)^x = \left(\frac{9}{4}\right)^4$, then $x =$ .....

b If $0.0085 = 8.5 \times 10^k$, then k = ...

c If $y = \frac{1}{4}$, $x = \frac{1}{3}$, then $(x - y)^{-2} =$ .....

3 (2)

If $a = \frac{2}{3}$, $b = \frac{-1}{2}$, then find the value of $(a - b)^{-1}$

.....

.....

4 Calculate: (2)

$6 \times (2)^2 \div 24 + 3^2$

.....

.....

10 Marks

Model (5)

1 Choose the correct answer: (3)

a The standard form of the number 490×10^{-8} is .....

1 4.9×10^{-8} **2** 4.9×10^{-7} **3** 4.9×10^{-6} **4** 4.9×10^{-10}

b Half milliard $= 5 \times 10^{.....}$

1 6 **2** −9 **3** 8 **4** 9

c $(x^{-2})^3 =$ ..... $x \neq 0$

1 $\frac{1}{x^5}$ **2** x^{-5} **3** x^6 **4** $\frac{1}{x^6}$

2 Complete each of the following: (3)

a If $\frac{9}{16} = \left(\frac{4}{3}\right)^{.....}$

b The standard form of the number 33000 is .....

c $10 - 4 \times (3^2 - 4 \div 2) + 18 =$ .....

3 (2)

If $x = \frac{1}{2}, y = \frac{2}{3}$, then find the value of $(x^2y^2)^{-3}$

.....

.....

4 Calculate: (2)

$(2 \times \sqrt{36} - 2^4) \div 4$

.....

.....

10 Marks

Model (1)

1 Choose the correct answer: (3)

a The measure of the exterior angle of the equilateral triangle is ..... .

1 30° 2 45° 3 60° 4 120°

b The parallelogram whose diagonals are equal in length and perpendicular is ..... .

1 rectangle 2 square 3 Rhombus 4 trapezium

c The quadrilateral with only two opposite parallel sides is called a ..... .

1 trapezium 2 square 3 Rhombus 4 parallelogram

2 Complete: (3)

a ABCD is a parallelogram in which m (∠A) = 80°, then m (∠B) + m (∠D) = ...

b If the measure of one angle of a triangle equals the sum of measures of the other two angles, then the measure of this angle is ..... .

c The two diagonals are perpendicular and not equal in length in ..... .

3 Answer the following: (4)

a **In the opposite figure:**

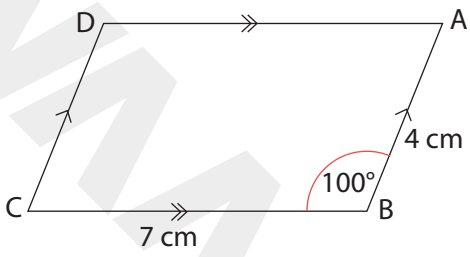
ABCD is a parallelogram, AB = 4 cm

BC = 7cm, m (∠B)= 100°

Find:

1 m (∠C) = ...

2 The perimeter of parallelogram ABCD .....

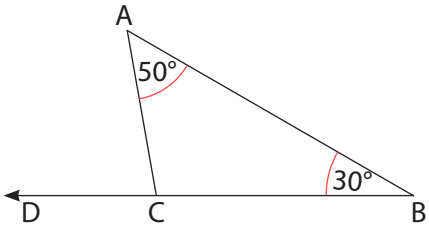


b **In the opposite figure:**

m (∠A) = 50°, m (∠B) = 30°, D ∈ BC

Find:

- m (∠ACD)



.....

.....

10 Marks

Model (2)

1 Choose the correct answer: (3)

a The parallelogram with equal sides is a ..... .

1 rectangle 2 rhombus 3 trapezium 4 square

b The sum of the measures of the interior angles of the triangle equals ..... .

1 90° 2 180° 3 270° 4 360°

c If ABCD is a parallelogram in which m (∠A) + m (∠C) = 140°, then m (∠B) = ...

1 40° 2 110° 3 70° 4 60°

2 Complete: (3)

a A square is ..... with two adjacent sides equal in length.

b In ΔABC, If m (∠A) + m (∠B) = 3 m (∠C), then m (∠C) = ...

c The measure of the exterior angle of a triangle is equal to .....

3 Answer the following: (4)

a **In the opposite figure:**

ABCD is a rhombus, m (∠ABD) = 65°, AB = 6cm

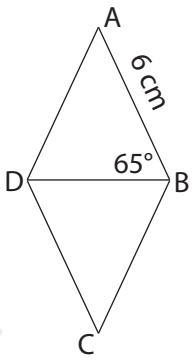
Find:

1 m (∠C)

.....

.....

.....



2 The perimeter of the rhombus ABCD

.....

b **In the opposite figure:**

$\overrightarrow{DF}$ // $\overline{BC}$

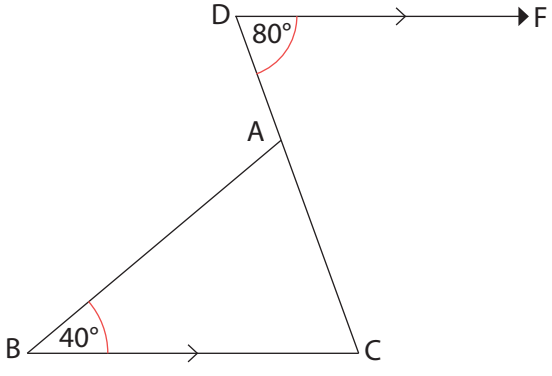
Find: m (∠DAB)

.....

.....

.....

.....



10 Marks

Model (3)

3

1 Choose the correct answer:

a The two diagonals are equal in length in the ..... .

1 parallelogram 2 trapezium

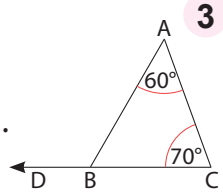
3 rectangle 4 rhombus

b In parallelogram ABCD, m (∠A) = 2m (∠B), then m (∠B) = ...

1 60° 2 120° 3 180° 4 30°

c **In the opposite figure:**

$D \in \overrightarrow{CB}$, m (∠ABD) = ...



1 60° 2 50° 3 130° 4 70°

3

2 Complete:

a If the perimeter of a square is 40 cm, then its side length is .....

b Any triangle has at most ..... obtuse angles.

c If the measures of two angles in a triangle are 35° and 55°, then the triangle is .....-angled.

4

3 Answer the following:

a **In the opposite figure:**

$\overrightarrow{AD}$ // $\overrightarrow{BC}$, m (∠DAB) = 65°

, m (∠ECF) = 55°, AF ∩ BC = {C}

Find: m (∠BAC)

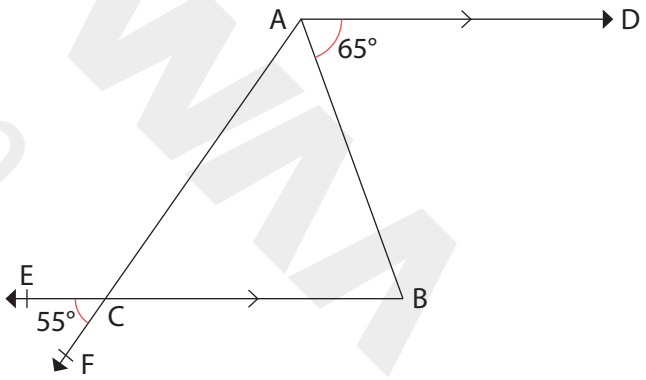
.....

.....

.....

.....

.....



b **In the opposite figure:**

E ∈ $\overrightarrow{DA}$, m (∠EAB) = 110°

m (∠C) = 70° , $\overrightarrow{DA}$ // $\overline{CB}$

Prove that: ABCD is a parallelogram

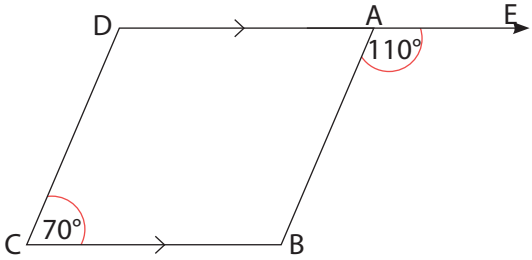
.....

.....

.....

.....

.....



10 Marks

Model (4)

1 Choose the correct answer:

3

a ABCD is a parallelogram, in which m (∠A) = 80°, then m (∠B) = ...

1 80° 2 90° 3 100° 4 120°

b Any triangle has at least ..... acute angles.

1 4 2 3 3 1 4 2

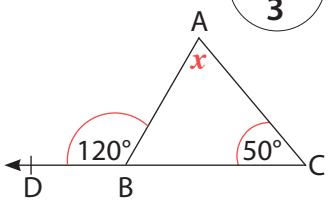
c The square is a ..... with two diagonals equal in length.

1 rhombus 2 rectangle 3 trapezium 4 parallelogram

2 Complete:

3

a In the opposite figure: x = ...°



b The parallelogram with right angle is called ..... .

c In Δ XYZ m (∠Y) > m (∠X) + m (∠Z), then the type of ∠Y is ..... .

3 Answer the following:

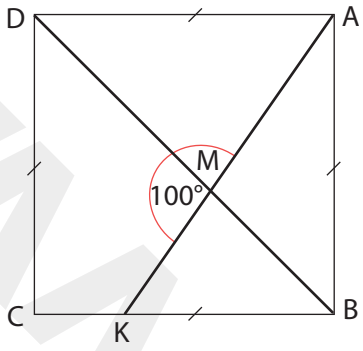
4

a **In the opposite figure:**

ABCD is a square, **find:**

1 m (∠BAK)

2 m (∠AKC)



.....

.....

.....

.....

.....

.....

.....

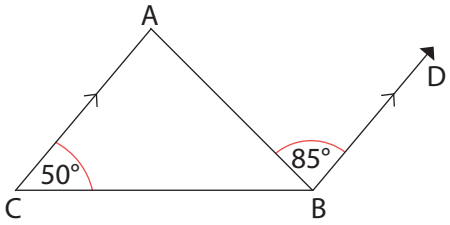
.....

b **In the opposite figure:**

$\overrightarrow{BD}$ // $\overline{CA}$, m (∠C) = 50°

, m (∠ABD) = 85°

Find: m (∠ABC)



.....

.....

.....

.....

10 Marks

Model (5)

1 Choose the correct answer:

3

a The diagonals are equal in length and not perpendicular in the ..... .

1 rectangle 2 Rhombus 3 square 4 parallelogram

b XYZ is a triangle, in which m (∠X) = 80° and m (∠Y) = 40° , then m (∠Z) = ...

1 60° 2 90° 3 20° 4 50°

c In the parallelogram, each two opposite angles are ..... .

1 complementary 2 reflex

3 supplementary 4 equal in measure

2 Complete:

3

a XYZL is a parallelogram, If m (∠X) = m (∠y) , then m (∠y) = ...

b If the measures of two angles in a triangle are 20° and 50°, then the triangle is .....-angled.

c If ABCD is a rhombus in which m (∠ABD) = 35°, then m (∠BAC) = ...

3 Answer the following:

4

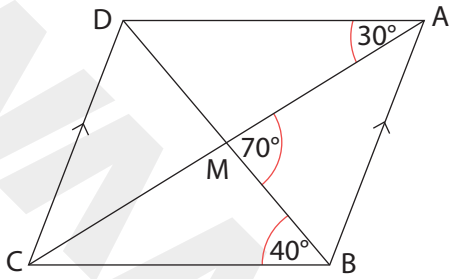
a **In the opposite figure:**

$\overline{AB}$ // $\overline{DC}$, $\overline{AC} \cap \overline{BD} = \{M\}$

m (∠DAC) = 30°, m (∠DBC) = 40°

And m (∠AMB) = 70°

Prove that: ABCD is a parallelogram.



.....

.....

.....

.....

.....

.....

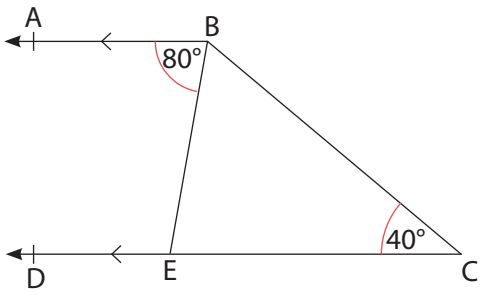
.....

b **In the opposite figure:**

$\overrightarrow{BA}$ // $\overrightarrow{CD}$, m (∠ABE) = 80°

m (∠C) = 40°

Find: m (∠EBC)



.....

.....

.....

.....

10 Marks

Model (1)

1 Choose the correct answer: (3)

a $3x^{-1} =$ ....., $x \neq 0$

1 $-3x$ **2** $\frac{3}{x}$ **3** $3x$ **4** $\frac{1}{3x}$

b $6{,}000 \times 50 =$ .....

1 300×10^2 **2** 30×10^5 **3** -3×10^3 **4** 3×10^5

c $\left(\frac{-2}{3}\right)^{-3} =$ .....

1 $\frac{27}{8}$ **2** $\frac{-8}{27}$ **3** $\frac{8}{27}$ **4** $\frac{-27}{8}$

2 Complete each of the following: (3)

a $3 \times 2 - 16 \div 8 =$ 4

b The multiplicative inverse of $(3)^{-2}$ is 9

c If $0.0000056 = 5.6 \times 10^x$, then $x =$ -6

3 Simplify: (2)

$$\frac{(-3)^6 \times (3)^{-3}}{(3)^5 \times (3)^{-4}}$$

$= 3^{6+(-3)-5-(-4)} = 3^2 = 9$

4 Find the result of the following in standard form: (2)

$(2.9 \times 10^4) + (4.2 \times 10^5)$

$= 10^4 (2.9 + 4.2 \times 10) = 44.9 \times 10^4 = 4.49 \times 10^5$

10 Marks

Model (2)

1 Choose the correct answer: (3)

a $\left(\frac{1}{3}\right)^{-2} =$ .....

1 $\frac{1}{9}$ **2** -9 **3** $\frac{-1}{9}$ **4** 9

b $0.0000073 = 7.3 \times$ .....

1 10^{-6} **2** 10^{5} **3** 10^{-5} **4** 10^{6}

c $2^{-8} \times 2^{-8} = 2^{m}$, then m = ...

1 -16 **2** -9 **3** -7 **4** zero

2 Complete each of the following: (3)

a If $x = 7^{-3}$, $y = 7^{3}$, then $xy = 1$

b The standard form of the number $0.7 \times 0.005 = 3.5 \times 10^{-3}$

c $2 \times 6 - 4 \div 2 + 1 = 11$

3 Simplify: (2)

$\frac{x^3 \times x^{-2}}{x^{-5} \times x}$ When $x \neq 0$, then find the value when $x = -2$

$= x^{3 + (-2) - (-5) - 1} = x^{5}$ When $x = -2$ $\therefore x^{5} = (-2)^{5} = -32$

4 Find the value of: (2)

$12 + (9 - 2) \times 3^{2}$

$12 + 7 \times 3^{2} = 12 + 7 \times 9 = 12 + 63 = 75$

10 Marks

Model (3)

1 Choose the correct answer: (3)

a $\frac{6a^2x^4}{2a^3x^3} =$ ..... where $a \neq 0, x \neq 0$

1 $3ax^2$ **2** $3a^5x^7$ **3** $\frac{3x}{a}$ **4** $\frac{3}{ax}$

b The number ..... is in standard form.

1 12×10^4 **2** 3.9×10^{-3} **3** 14.1×10^{-4} **4** 0.38×10^6

c $10 \times 4 - (2 \times 6 - 8) =$ .....

1 zero **2** 80 **3** 36 **4** 1

2 Complete each of the following: (3)

a $\left(\frac{1}{2}\right)^{-1} = 2$

b The number 0.00053 in the scientific notation is 5.3×10^{-4}

c $(8 - 6 \div 2)^2 + 3 \times 4 = 37$

3 Find the value of: (2)

$\left(\frac{9^3 \times 9}{9^5}\right)^{-3}$

$= (9^{3+1-5})^{-3} = (9^{-1})^{-3} = 9^3 = 729$

4 Write the following number in the standard form: (2)

$581200000000 = 5.812 \times 10^{11}$

10 Marks

Model (4)

1 Choose the correct answer: (3)

a $x^6 \div x^{-2} =$ ..... where $x \neq 0$

1 x^3 2 x^4 3 x^{12} 4 x^8

b $23800000 = 2.38 \times$ .....

1 10^7 2 10^{-7} 3 10^6 4 10^{-6}

c $(2)^{-3}$ ..... $(-2)^3$

1 > 2 < 3 = 4 ≤

2 Complete each of the following: (3)

a If $\left(\frac{4}{9}\right)^x = \left(\frac{9}{4}\right)^4$, then $x = -4$

b If $0.0085 = 8.5 \times 10^k$, then k = –3

c If $y = \frac{1}{4}, x = \frac{1}{3}$, then $(x - y)^{-2} = 144$

3 (2)

If $a = \frac{2}{3}, b = \frac{-1}{2}$, then find the value of $(a - b)^{-1}$

$\left(\frac{2}{3} - \frac{-1}{2}\right)^{-1} = \left(\frac{4}{6} + \frac{3}{6}\right)^{-1} = \left(\frac{7}{6}\right)^{-1} = \frac{6}{7}$

4 Calculate: (2)

$6 \times (2)^2 \div 24 + 3^2$

$6 \times 4 \div 24 + 9 = 24 \div 24 + 9 = 1 + 9 = 10$

10 Marks

Model (5)

1 Choose the correct answer: (3)

a The standard form of the number 490×10^{-8} is .....

1 4.9×10^{-8} **2** 4.9×10^{-7} **3** 4.9×10^{-6} **4** 4.9×10^{-10}

b Half milliard $= 5 \times 10^{.....}$

1 6 **2** −9 **3** 8 **4** 9

c $(x^{-2})^3 =$ ..... $x \neq 0$

1 $\frac{1}{x^5}$ **2** x^{-5} **3** x^6 **4** $\frac{1}{x^6}$

2 Complete each of the following: (3)

a If $\frac{9}{16} = \left(\frac{4}{3}\right)^{-2}$

b The standard form of the number 33000 is 3.3×10^4

c $10 - 4 \times (3^2 - 4 \div 2) + 18 =$ zero

3 (2)

If $x = \frac{1}{2}$, $y = \frac{2}{3}$, then find the value of $(x^2y^2)^{-3}$

$\left(\frac{1}{4} \times \frac{4}{9}\right)^{-3} = \left(\frac{1}{9}\right)^{-3} = 9^3 = 729$

4 Calculate: (2)

$(2 \times \sqrt{36} - 2^4) \div 4$

$(2 \times 6 - 16) \div 4 = (12 - 16) \div 4 = -4 \div 4 = -1$

10 Marks

Model (1)

1 Choose the correct answer: (3)

a The measure of the exterior angle of the equilateral triangle is ..... .

1 30° 2 45° 3 60° 4 **120°**

b The parallelogram whose diagonals are equal in length and perpendicular is ..... .

1 rectangle 2 **square** 3 Rhombus 4 trapezium

c The quadrilateral with only two opposite parallel sides is called a ..... .

1 **trapezium** 2 square 3 Rhombus 4 parallelogram

2 Complete: (3)

a ABCD is a parallelogram in which m (∠A) = 80°, then m (∠B) + m (∠D) = **200°**.

b If the measure of one angle of a triangle equals the sum of measures of the other two angles, then the measure of this angle is **90°**.

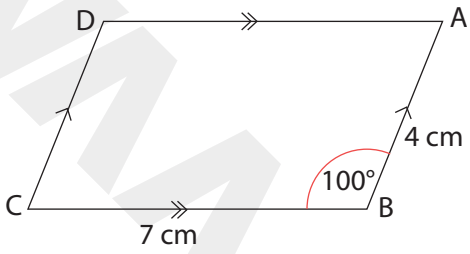
c The two diagonals are perpendicular and not equal in length in **Rhombus**.

3 Answer the following: (4)

a **In the opposite figure:**

ABCD is a parallelogram, AB = 4 cm

BC = 7cm, m (∠B)= 100°



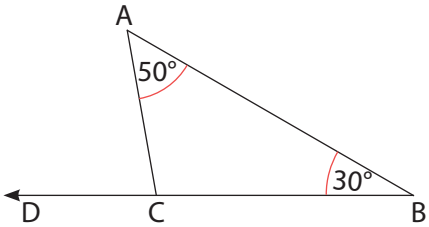
Find:

1 m (∠C) = **180° – 100° = 80°**

2 The perimeter of parallelogram ABCD **(7 + 4) × 2 = 22 cm**

b **In the opposite figure:**

m (∠A) = 50°, m (∠B) = 30°, D ∈ BC



Find:

- m (∠ACD)

∵ **ACD is an exterior angle of ΔABC**

∴ **(∠ACD) = 50° + 30° = 80°**

10 Marks

Model (2)

1 Choose the correct answer: (3)

a The parallelogram with equal sides is a ..... .

1 rectangle 2 **rhombus** 3 trapezium 4 square

b The sum of the measures of the interior angles of the triangle equals ..... .

1 90° 2 **180°** 3 270° 4 360°

c If ABCD is a parallelogram in which m (∠A) + m (∠C) = 140°, then m (∠B) = ...

1 40° 2 **110°** 3 70° 4 60°

2 Complete: (3)

a A square is **a rectangle** with two adjacent sides equal in length.

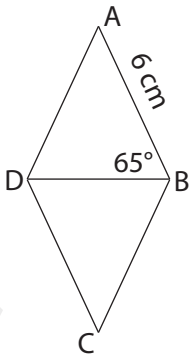
b In ΔABC, If m (∠A) + m (∠B) = 3 m (∠C), then m (∠C) = **45°**

c The measure of the exterior angle of a triangle is equal to **the sum of the measures of its non-adjacent interior angles.**

3 Answer the following: (4)

a **In the opposite figure:**

ABCD is a rhombus, m (∠ABD) = 65°, AB = 6cm



Find:

1 m (∠C)

∵ **ABCD is a rhombus**

∴ **m (∠ABC) = 65° + 65° = 130°**

∴ **m (∠C) = 180° – 130° = 50°**

2 The perimeter of the rhombus ABCD

6 × 4 = 24 cm

b **In the opposite figure:**

$\overrightarrow{DF}$ // $\overline{BC}$

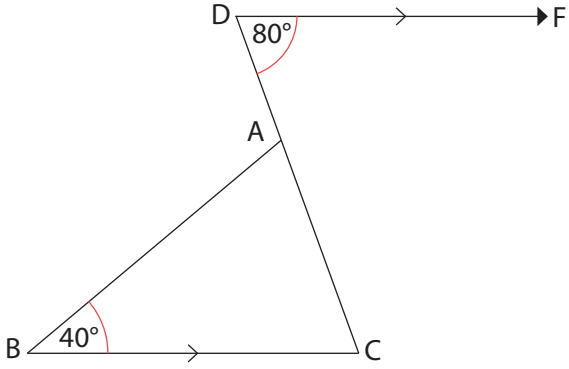
Find: m (∠DAB)

∵ $\overrightarrow{DF}$ // $\overline{BC}$

∴ **m (∠FDC) = m (∠C) = 80° (alternate)**

∵ **∠DAB is an exterior angle of ΔABC**

∴ **m (∠DAB) = 40° + 80° = 120°**



10 Marks

Model (3)

3

1 Choose the correct answer:

a The two diagonals are equal in length in the ..... .

1 parallelogram 2 trapezium

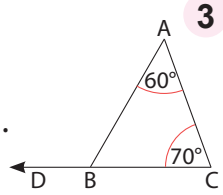
3 **rectangle** 4 rhombus

b In parallelogram ABCD, m (∠A) = 2m (∠B), then m (∠B) = ...

1 **60°** 2 120° 3 180° 4 30°

c **In the opposite figure:**

D ∈ $\overrightarrow{CB}$, m (∠ABD) = ...



1 60° 2 50° 3 **130°** 4 70°

3

2 Complete:

a If the perimeter of a square is 40 cm, then its side length is **10 cm.**

b Any triangle has at most **1** obtuse angles.

c If the measures of two angles in a triangle are 35° and 55°, then the triangle is **right**-angled.

4

3 Answer the following:

a **In the opposite figure:**

$\overrightarrow{AD}$ // $\overrightarrow{BC}$, m (∠DAB) = 65°

, m (∠ECF) = 55°, AF ∩ BC = {C}

Find: m (∠BAC)

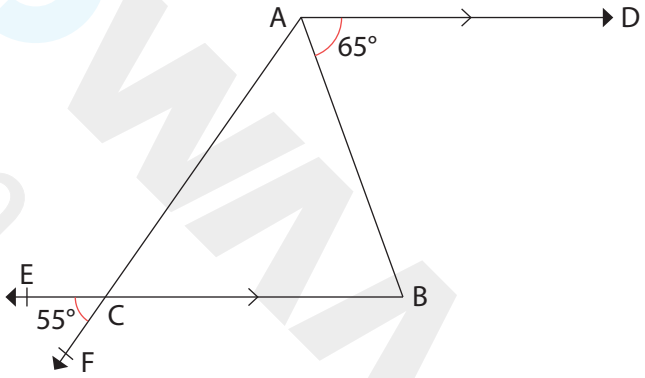
∵ $\overrightarrow{AD}$ // $\overrightarrow{BC}$

∴ m (∠DAB) = m (∠B) = 65° (alternate)

∵ $\overrightarrow{AF}$ ∩ $\overrightarrow{BE}$ = {C}

∴ m (∠ACB) = m (∠ECF) = 55° (V.O.A)

∴ m (∠BAC) = 180° – (65° + 55°) = 60°



b **In the opposite figure:**

E ∈ $\overrightarrow{DA}$, m (∠EAB) = 110°

m (∠C) = 70° , $\overrightarrow{DA}$ // $\overline{CB}$

Prove that: ABCD is a parallelogram

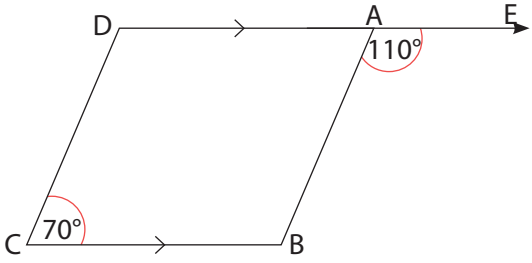
∵ $\overrightarrow{DA}$ // $\overline{CB}$

∴ m (∠D) = 180° – 70° = 110° (interior)

∵ m (∠EAB) = m (∠D) = 110° (corresponding)

∴ $\overline{AB}$ // $\overline{DC}$, $\overline{AD}$ // $\overline{BC}$

∴ ABCD is a parallelogram.



10 Marks

Model (4)

1 Choose the correct answer: (3)

a ABCD is a parallelogram, in which m (∠A) = 80°, then m (∠B) = ...

1 80° 2 90° 3 **100°** 4 120°

b Any triangle has at least ..... acute angles.

1 4 2 3 3 1 4 **2**

c The square is a ..... with two diagonals equal in length.

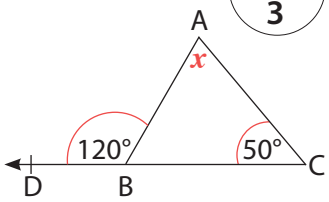
1 **rhombus** 2 rectangle 3 trapezium 4 parallelogram

2 Complete: (3)

a In the opposite figure: x = **70°**

b The parallelogram with right angle is called **rectangle**.

c In Δ XYZ m (∠Y) > m (∠X) + m (∠Z), then the type of ∠Y is **obtuse**.



3 Answer the following: (4)

a **In the opposite figure:**

ABCD is a square, **find:**

1 m (∠BAK)

2 m (∠AKC)

∵ $\overline{AK} \cap \overline{BD}$ = {M}

∴ m (∠AMB) = m (∠DMK) = 100° (V.O.A)

∵ $\overline{DB}$ is a diagonal of the square ABCD

∴ m (∠ABD) = 45°

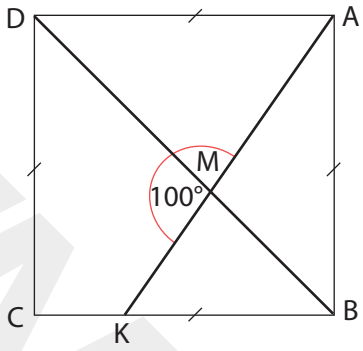
1 ∴ m (∠BAK) = 180° – (100° + 45°) = 35°

∵ m (∠DBC) = 45°

m (∠BMK) = 180° – 100° = 80° (Straight angle)

∵ ∠AKC is an exterior angle of Δ BMK

2 ∴ m (∠AKC) = 80° + 45° = 125°



b **In the opposite figure:**

$\overrightarrow{BD}$ // $\overline{CA}$, m (∠C) = 50°

, m (∠ABD) = 85°

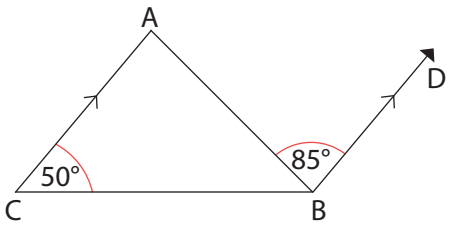
Find:

1 m (∠ABC)

∵ $\overrightarrow{BD}$ // $\overrightarrow{CA}$

∴ m (∠A) = m (∠ABD) = 85° (alternate)

∴ m (∠ABC) = 180° – (50° + 85°) = 45°



10 Marks

Model (5)

1 Choose the correct answer: (3)

a The diagonals are equal in length and not perpendicular in the ..... .

1 rectangle 2 Rhombus 3 square 4 parallelogram

b XYZ is a triangle, in which m (∠X) = 80° and m (∠Y) = 40° , then m (∠Z) = ...

1 60° 2 90° 3 20° 4 50°

c In the parallelogram, each two opposite angles are ..... .

1 complementary 2 reflex

3 supplementary 4 equal in measure

2 Complete: (3)

a XYZL is a parallelogram, If m (∠X) = m (∠y) , then m (∠y) = 90° .

b If the measures of two angles in a triangle are 20° and 50°, then the triangle is obtuse-angled.

c If ABCD is a rhombus in which m (∠ABD) = 35°, then m (∠BAC) = 55° .

3 Answer the following: (4)

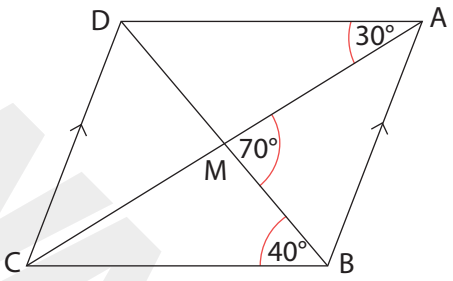
a **In the opposite figure:**

$\overline{AB}$ // $\overline{DC}$, $\overline{AC} \cap \overline{BD} = \{M\}$

m (∠DAC) = 30°, m (∠DBC) = 40°

And m (∠AMB) = 70°

Prove that: ABCD is a parallelogram.



∵ AMC is a straight angle

∴ m (∠BMC) = 180° – 70° = 110°

In Δ BMC:

∴ m (∠MCB) = 180° – (40° + 110°) = 30°

∵ m (∠DAC) = m (∠MCB) = 30° (alternate)

∴ $\overline{AD}$ // $\overline{BC}$, ∵ $\overrightarrow{AB}$ // $\overrightarrow{DC}$

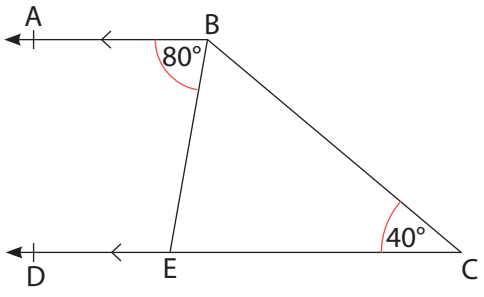
∴ ABCD is a parallelogram.

b **In the opposite figure:**

$\overrightarrow{BA}$ // $\overrightarrow{CD}$, m (∠ABE) = 80°

m (∠C) = 40°

Find: m (∠EBC)



∵ $\overrightarrow{BA}$ // $\overrightarrow{ED}$

∴ m (∠BED) = 180° – 80° = 100° (interior)

∵ ∠BED is an exterior angle of ΔBEC

∴ m (∠EBC) = 100° – 40° = 60°

1-4 Scientific notation of the rational numbers

- $a \times 10^n$ where $1 \leq |a| < 10$ and $n \in \mathbb{Z}$

Write each of the following two numbers in the standard form :

1) 8 200 000 000

.....

2) 650 000 000

.....

3) 0.000000135

.....

4) 0.00000102

.....

5) 45×10^8

.....

.....

6) 706.4×10^5

.....

.....

7) 0.248×10^{-7}

.....

.....

8) -0.0015×10^{-9}

.....

.....

9) 17×10^8

.....

.....

10) 530.5×10^9

.....

.....

11) -0.999×10^{-5}

.....

.....

Arrange these areas descendingly.

12) 7.35×10^7 , 1.4×10^7, 1.66×10^8 , 7.6×10^6 , 8.65×10^7

13) $(1.2 \times 10^5) \times (4 \times 10^3)$

14) $(6.5 \times 10^4) \times (8 \times 10^2)$

15) $(2.4 \times 10^{11}) \div (1.2 \times 10^{-4})$

16) $(6.6 \times 10^7) \times (3 \times 10)^4$

17) $(2.3 \times 10^6) + (3.7 \times 10^5)$

18) $30\,000 \times 400\,000$

19) $(50\,000)^3$

20) $(0.0003)^5$

21) $(-0.001)^6$

22) $(400\,000)^2$

23) $(5.3 \times 10^7) \times (3 \times 10^5)$

24) $(3.2 \times 10^9) - (0.2 \times 10^8)$

1-5 Order of operations

1) $3 + 6 \times (5 + 4) \div 3 - 7$

2) $9 - 5 \div (8 - 3) \times 2 + 6$

3) $4 - 3\left[4 - 2(6 - 3)\right] \div 2$

4) $16 \div \left[8 - 3(4 - 2)\right] + 1$

5) $8 \times 2^2 - 7 \times (4 + 1)$

6) $2 + 3\left[5 + (4 - 1)^2\right]$

7) $\dfrac{11-(5-4)}{5^2-10\times 2}$

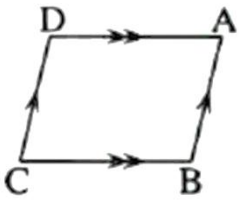
8) $7+8\div\dfrac{4+12-2}{3^2-2}-(2^3+2)$

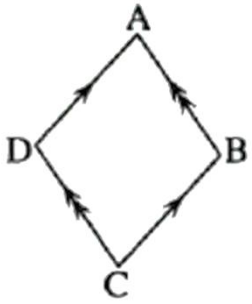
9) $20\div(12-2)\times 3^2-2$

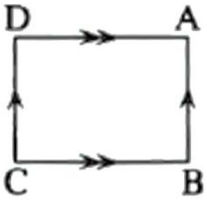
10) $\dfrac{6\times 3+10\div 5}{2-(10-2^2)}$

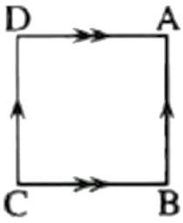
3-3 The parallelogram and its properties

A parallelogram is a quadrilateral , in which each two opposite sides are parallel.



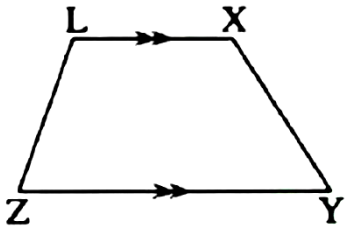






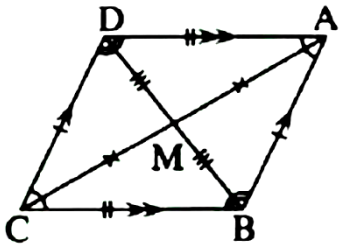
Each of the above figures is called a parallelogram for $\overline{AB} // \overline{DC}$ and $\overline{AD} // \overline{BC}$

- A quadrilateral in which only two sides are parallel is called a trapezium , as shown in the opposite figure in which : $\overline{XL} // \overline{YZ}$

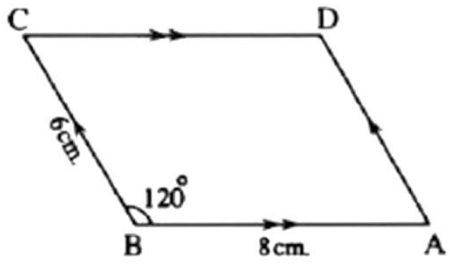


Properties of a parallelogram :

- Each two opposite sides are parallel
- Each two opposite sides are equal in length
- Each two opposite angles are equal in measur
- Each two consecutive angles are supplementary
- The diagonals bisect each other
- **The perimeter of the parallelogram = The sum of two consecutive sides × 2**



1) **In the opposite figure :**



ABCD is a parallelogram in which :

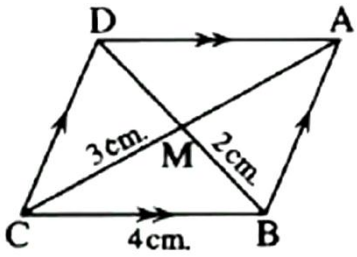
AB = 8 cm. , BC = 6 cm. and m (∠ B) = 120°

Find : 1 The length of each of $\overline{CD}$ and $\overline{DA}$

2 The measure of each of ∠ D , ∠ A and ∠ C

3 The perimeter of ABCD

2) **In the opposite figure :**



ABCD is a parallelogram whose diagonals intersect at M

If BC = 4 cm. , BM = 2 cm. and MC = 3 cm. ,

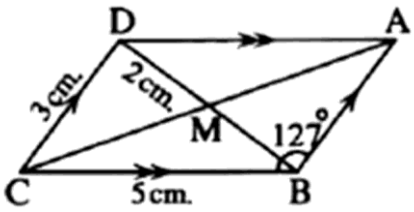
then find the perimeter of Δ AMD

3) **In the opposite figure :**

ABCD is a parallelogram whose diagonals intersect at M

If BC = 5 cm. , DC = 3 cm. , DM = 2 cm.

and m (∠ ABC) = 127° ,



complete the following :

a. AB = ... cm. and AD = ... cm. b. BD = ... cm.

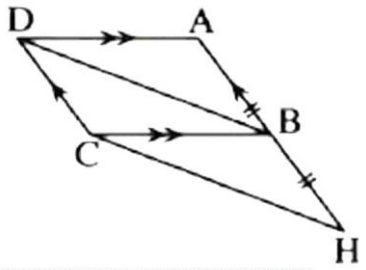
c. m (∠ ADC) = ...° d. m (∠ BAD) = ...°

e. The perimeter of ▱ ABCD = ... cm. f. m (∠ BCD) = ...°

4) **In the opposite figure :**

ABCD is a parallelogram , $H \in \overrightarrow{AB}$ where AB = BH

Prove that : BHCD is a parallelogram



.....

.....

.....

.....

.....

.....

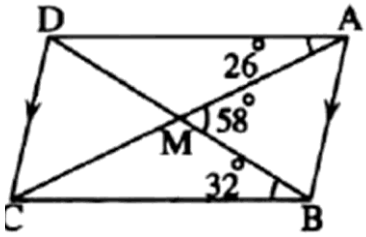
.....

5) **In the opposite figure :**

ABCD is a quadrilateral , its diagonals intersect at M ,

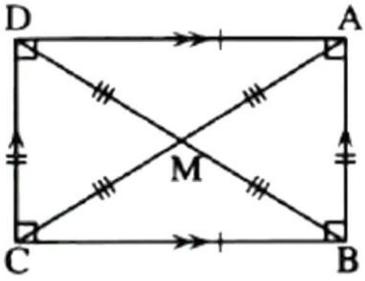
$\overline{AB} \parallel \overline{CD}$, m (∠ AMB) = 58° , m (∠ MBC) = 32°

and m (∠ MAD) = 26°



3-4 The special cases of the parallelogram

- **A rectangle is a parallelogram with a right angle.**



  - The four angles of a rectangle are all equal in measure and the measure of each is 90°
  - The two diagonals of a rectangle are equal in length.
  - **The perimeter of the rectangle = (length + width) × 2**

- A rhombus is a parallelogram in which two adjacent sides are equal in length.

  The four sides of a rhombus are all equal in length.

  The two diagonals of the rhombus are perpendicular

-

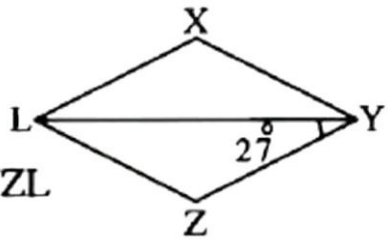
  - **The perimeter of the square = the length of one side × 4**

- **We can also define the square as follows :**
  - A square is a rectangle with two adjacent sides equal in length.
  - A square is a rectangle with two perpendicular diagonals.
  - A square is a rhombus with a right angle.
  - A square is a rhombus with two diagnals equal in length.

1) **In the opposite figure :**

XYZL is a rhombus in which m (∠ LYZ) = 27°

Calculate the measures of the angles of the rhombus XYZL



.....

.....

.....

.....

.....

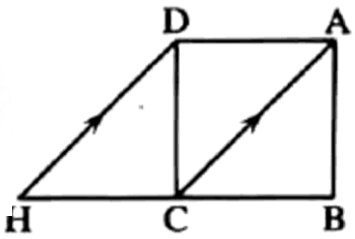
.....

.....

2) **In the opposite figure :**

ABCD is a square. Draw $\overrightarrow{DH}$ // $\overline{AC}$ to intersect $\overrightarrow{BC}$ at H

1 **Prove that :** CH = BC **2** **Find :** m (∠ ADH)

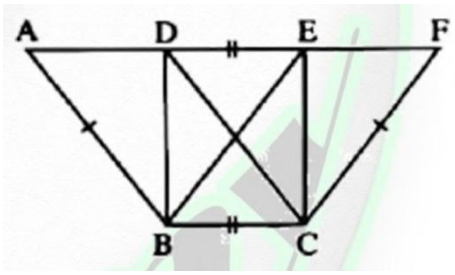


3) **In the opposite figure :**

ABCD , EBCF are two parallelograms ,

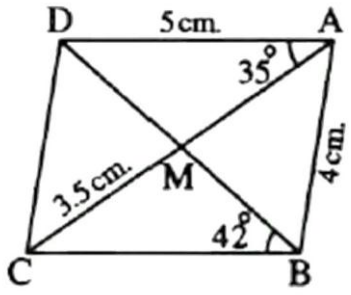
D and E belong to $\overleftrightarrow{AF}$, AB = FC , BC = DE

Prove that : The figure DBCE is a rectangle.



Using the given in each figure , complete where M is the intersection point of the diagonals :

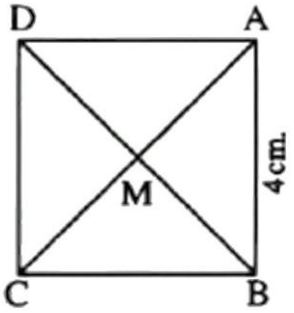
4)



ABCD is a parallelogram :

- The perimeter of Δ ABC = ... cm.
- m (∠ AMB) = ...°

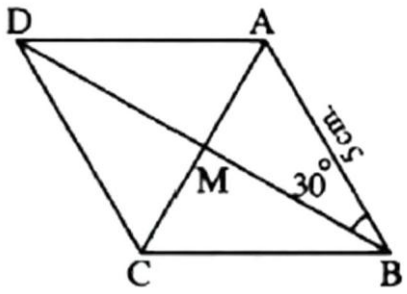
5)



ABCD is a square :

- The perimeter of the square = ... cm.
- m (∠ BAC) = ...°

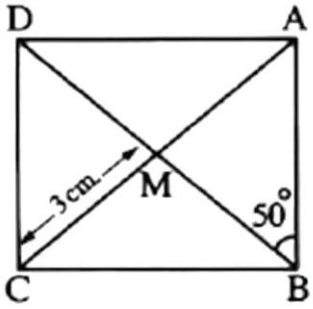
6)



ABCD is a rhombus :

- AD = ... cm.
- m (∠ BAM) = ...°

7)

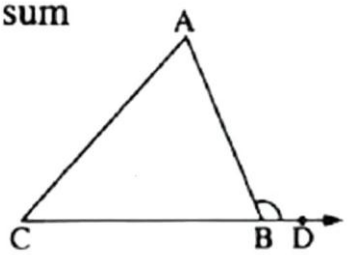


ABCD is a rectangle :

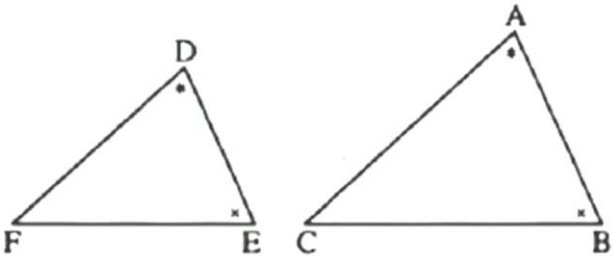
- BD = ... cm.
- m (∠ MCD) = ...°

3-5 The Triangle

- **The sum of the measures of the interior angles of a triangle is 180°**
- If the sum of measures of two angles in a triangle equals 90° , then the third angle is right.
- If the sum of measures of two angles in a triangle is less than 90° , then the third angle is obtuse.
- If the sum of measures of two angles in a triangle is more than 90° , then the third angle is acute.
- The measure of the exterior angle of a triangle is equal to the sum of the measures of its non adjacent interior angles.

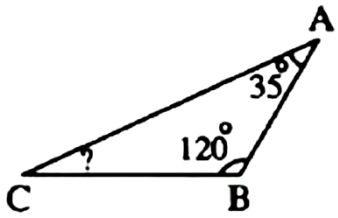


- If two angles of one triangle equal two angles of another triangle in measure , then the third angle of the first triangle is equal in measure to the third angle of the other triangle.



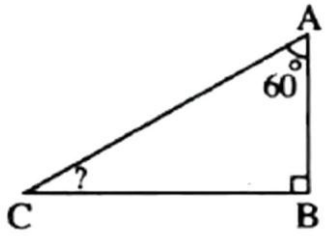
In each of the following figures , find the measure of the angle marked by (?) :

1)



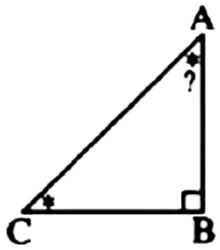
m (∠ C) = ...°

2)



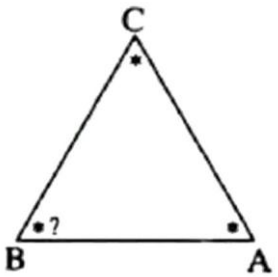
m (∠ C) = ...°

3)



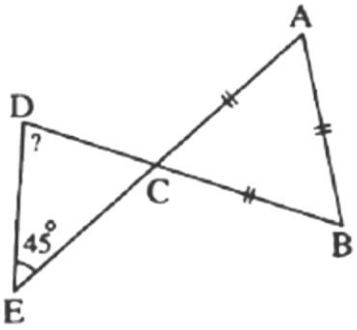
m (∠ A) = ...°

4)



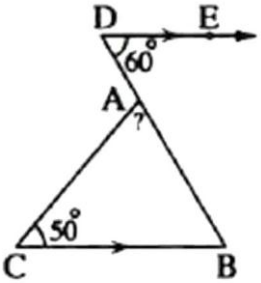
m (∠ B) = ...°

5)



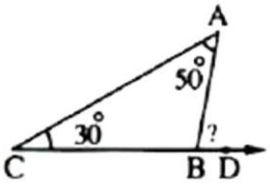
m (∠ D) = ...°

6)



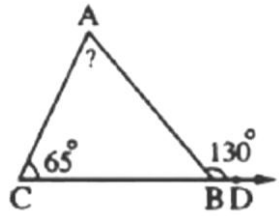
m (∠ BAC) = ...°

7)



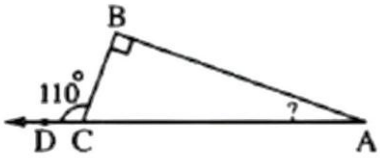
m (∠ ABD) = ...°

8)



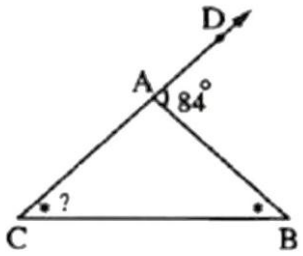
m (∠ A) = ...°

9)



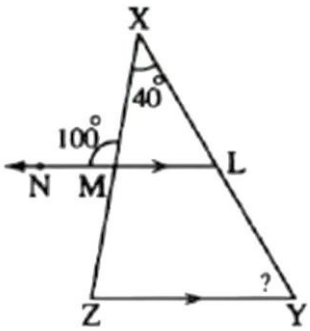
m (∠ A) = ...°

10)



m (∠ C) = ...°

11)



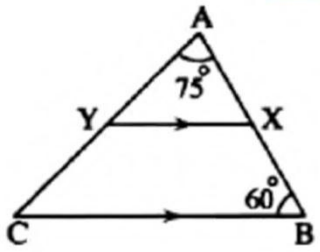
m (∠ Y) = ...°

12) **In the opposite figure :**

ABC is a triangle in which m (∠ A) = 75° ,

m (∠ B) = 60° , X ∈ $\overline{AB}$ and Y ∈ $\overline{AC}$

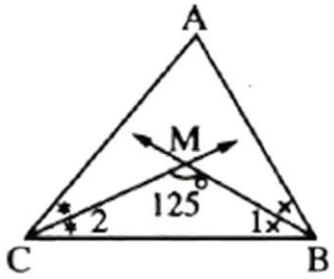
such that $\overline{XY}$ // $\overline{BC}$ **Find :** m (∠ AYX)



13) **In the opposite figure :**

$\overrightarrow{BM}$ bisects ∠ ABC , $\overrightarrow{CM}$ bisects ∠ ACB

and m (∠ BMC) = 125° **Find :** m (∠ A)

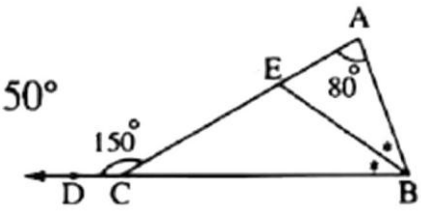


14) **In the opposite figure :**

ABC is a triangle , $D \in \overrightarrow{BC}$ and $E \in \overline{AC}$ where

$\overrightarrow{BE}$ bisects $\angle ABC$, $m(\angle A) = 80°$ and $m(\angle ACD) = 150°$

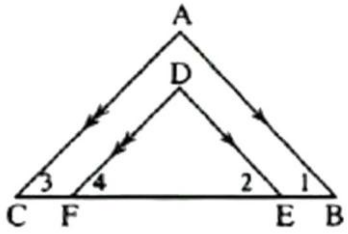
Find : **1** $m(\angle ABC)$ **2** $m(\angle BEC)$



15) **In the opposite figure :** ABC and DEF are two triangles ,

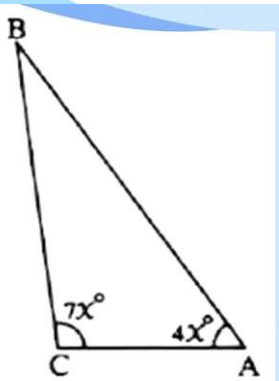
$E \in \overline{BC}$, $F \in \overline{BC}$, $\overline{DE} // \overline{AB}$ and $\overline{DF} // \overline{AC}$

Prove that : $m(\angle A) = m(\angle D)$



16) **In the opposite figure :**

ABC is a triangle in which m (∠ A) = 2 m (∠ B) = 4 $x°$ and m (∠ C) = 7 $x°$ **Prove that :** ∠ C is an obtuse angle.



.....

.....

.....

.....

.....

.....

.....

17) ABC is a triangle in which m (∠ A) : m (∠ B) : m (∠ C) = 2 : 3 : 5

Prove without finding the measures of the angles of the triangle that the triangle is right-angled , then mention the right angle.

.....

.....

.....

.....

.....

.....

.....

.....

Lesson (4)

Scientific notation of the rational number

☞ The number is written in the standard form as $a \times 10^n$ where $1 \leq |a| < 10$ and $n \in Z$.

[1] Which of the following numbers are in the standard form?

(1) 5.3×10^7

(2) 0.2×10^{-4}

(3) 0.025×10^8

(4) 7×10^{-4}

(5) 10×10^{-10}

(6) 4.25×10

(7) 33.9×10^6

(8) -5.783×10^2

(9) -0.0003×10^3

(10) 3.912×10^{-2}

[2] Write each of the following numbers are in the standard form:

(1) 600 000 = ...

(2) -20 000 = ...

(3) 7 million = ...

(4) 19 million = ...

(5) 0.0006 = ...

(6) 0.000053 = ...

(7) 0.000864 = ...

(8) 0.421 = ...

(9) 510 000 000 km^2 = ...

(10) 68×10^5 = ...

(11) 68×10^{-5} = ...

(12) 720×10^6 = ...

(13) 750×10^{-9} = ...

(14) -32.4×10^4 = ...

(15) 0.0005×10^{15} = ...

(16) 0.0020205×10^{12} = ...

[3] Write the result of each of the following in the standard form:

(1) $(6.4 \times 10^8) \times (1.5 \times 10^5)$ = ...

(2) $(8.2 \times 10^7) \times (2.1 \times 10^{-4})$ = ...

(3) $(5.02 \times 10^{-4}) \times (0.1 \times 10^{-3})$ = ...

(4) $(3.8 \times 10^8) \div (1.9 \times 10^6)$ = ...

(5) $(125.5 \times 10^{-3}) \div (5 \times 10^4)$ = ...

(6) $(3.8 \times 10^5) + (4.6 \times 10^4)$ = ...

(7) $(4.54 \times 10^4) + (3.76 \times 10^3)$ = ...

(8) $(5.3 \times 10^8) - (0.8 \times 10^7)$ = ...

(9) $(2.65 \times 10^{-2}) + (6.34 \times 10^{-3})$ = ...

[4] Choose the correct answer:

(1) 3.04×10^{7} = ...

(a) 340 000 (b) 304 000 (c) 3 400 000 (d) 30 400 000

(2) 2.37×10^{-4} = ...

(a) 0.00237 (b) 0.000237 (c) 23700 (d) 0.0000237

(3) If $0.00079 = 7.9 \times a$, then a = ...

(a) 10^{3} (b) 10^{-3} (c) 10^{-4} (d) 10^{4}

(4) If $0.00000503 = m \times 10^{-5}$, then m = ...

(a) 503 (b) 5.03 (c) 50.3 (d) 0.503

[4] Find the value of n in each of the following:

(1) $800\,000 = 8 \times 10^{n}$ n = ...

(2) $0.00000006 = 6 \times 10^{n}$ n = ...

(3) $0.00052 = 5.2 \times 10^{n}$ n = ...

(4) $0.000357 = 3.57 \times 10^{n}$ n = ...

(5) $76293 = n \times 10^{4}$ n = ...

Lesson (5)

Order of mathematical operations

(1) Perform the operations within parentheses.

(2) Evaluate the power.

(3) Perform × and ÷ from left to right.

(4) Perform + and - from left to right.

[1] Calculate the value of each of the following:

(1) $3 + 12 \div 6$

= .....

= .....

= .....

(2) $2 \times 6 - 4 \div 2$

= .....

= .....

= .....

(3) $4 \times 7 - 3^2$

= .....

= .....

= .....

(4) $144 - 8 \div 2^3$

= .....

= .....

= .....

(5) $196 \div (7-5)^2$

= .....

= .....

= .....

(6) $7\ (6^2 \div 2 \times 3)$

= .....

= .....

= .....

(7) $12\ (2^2) \div 24 + 3^2$

= .....

= .....

= .....

(8) $9\ (4^2) \div 2^2 \times 3$

= .....

= .....

= .....

(9) $2 - [(7 - 3) - 2]$

= .....

= .....

= .....

(10) $[4 - (5 - 2)] - 1$

= .....

= .....

= .....

(11) $3+[5+2(8\div4)]$

= .....

= .....

= .....

(12) $2[(5^2+1)-(4^2-1)]$

= .....

= .....

= .....

(13) $5[(2^2-1)-(2^2-2)]$

= .....

= .....

= .....

(14) $\frac{15+7}{15-4}$

= .....

= .....

= .....

(15) $\frac{8+20-4}{8-4}$

= .....

= .....

= .....

(16) $\frac{5+2\times5}{2^2+1}+5^2-5$

= .....

= .....

= .....

(17) $\frac{-4\times(-10)}{-9+7}$

= .....

= .....

= .....

(18) $2\times6-4\div2$

= .....

= .....

= .....

(1) If $x = 3$, what is the numerical value of the expression $2\left(\frac{5x+3}{4x-3}\right)$

.....

.....

(2) Evaluate: $16t\div(4s)+3st$, for $t = 9$ and $s = 6$

.....

.....

(3) Simplify: $\frac{n}{2}(3n-6)+\frac{1}{3}(3+9n)$, then find its numerical value when $n = 1$.

.....

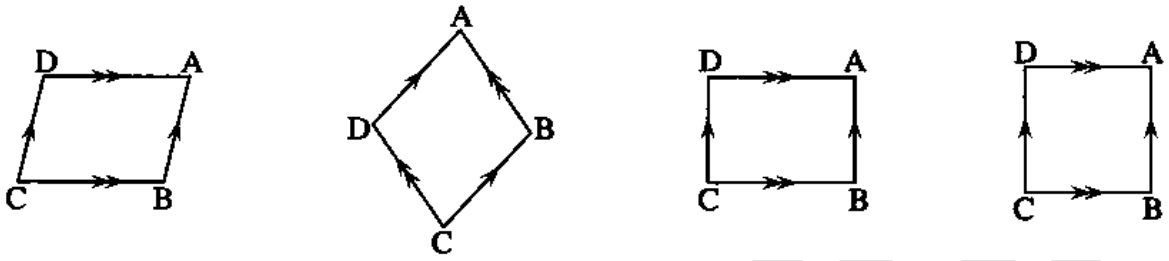
.....

.....

Lesson (3)
The parallelogram and its properties

Definition :

A parallelogram is a quadrilateral , in which each two opposite sides are parallel.

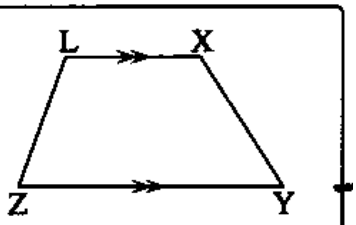


Each of the above figures is called a parallelogram for $\overline{AB} // \overline{DC}$ and $\overline{AD} // \overline{BC}$

Notice that :

A quadrilateral in which only two sides are parallel is called a trapezium , as shown in the opposite figure in which :

$\overline{XL} // \overline{YZ}$



When does a quadrilateral represent a parallelogram ?

A quadrilateral represents a parallelogram if one of the following conditions satisfies

Each two opposite sides are parallel.	Each two opposite sides are equal in length.	Two opposite sides are parallel and equal in length.	Each two opposite angles are equal in measure.	The two diagonals bisect each other.

Complete each of the following :

1. In a parallelogram , every two opposite sides are ..... , ...
2. In a parallelogram , every two opposite angles are .....
3. In a parallelogram , every two consecutive angles are .....
4. In a parallelogram , the two diagonals .....
5. The quadrilateral in which two sides are parallel is called .....
6. A quadrilateral represents a parallelogram if .....

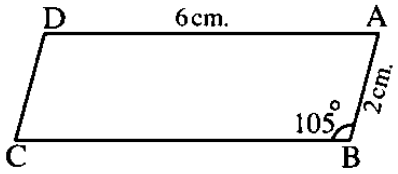
7. ABCD is a parallelogram in which m (∠ A) = 50° , then m (∠ B) = ... °

8. In the parallelogram XYZL , if m (∠ X) = $\frac{1}{2}$ m (∠ Y) , then m (∠ Y) = ... °

9. **In the opposite figure :**

ABCD is a parallelogram in which AB = 2 cm. ,

AD = 6 cm. and m (∠ B) = 105°



Complete the following :

(1) BC = ... cm. , DC = ... cm.

(2) m (∠ D) = ...° , m (∠ A) = ...° and m (∠ C) = ...°

(3) The perimeter of the parallelogram ABCD = ... cm.

Choose the correct answer :

10. ABCD is a parallelogram in which : m (∠ A) = 50° , then m (∠ C) = ...

(a) 50° (b) 60° (c) 130° (d) 150°

11. ABCD is a parallelogram in which : m (∠ A) + m (∠ C) = 140°
, then m (∠ B) = ...

(a) 70° (b) 40° (c) 110° (d) 220°

12. If the lengths of two consecutive sides of a parallelogram are 3 cm.
and 5 cm. , then its perimeter equals ..... cm.

(a) 12 (b) 14 (c) 16 (d) 18

13. If the perimeter of a parallelogram is 25 cm. and if one of its sides
is of length 7 cm. , then the consecutive side is of length ..... cm.

(a) 7 (b) 18 (c) 12.5 (d) 5.5

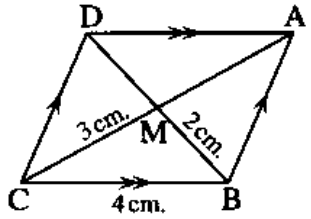
Essay problems:

1. **In the opposite figure :**

ABCD is a parallelogram whose diagonals intersect at M

If BC = 4 cm. , BM = 2 cm. and MC = 3 cm. ,

then find the perimeter of Δ AMD



.....

.....

.....

.....

.....

.....

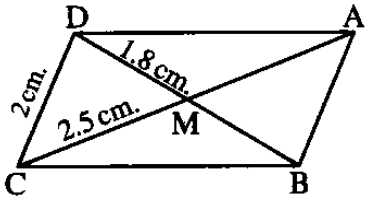
2. **In the opposite figure :**

ABCD is a parallelogram such that :

$\overline{AC} \cap \overline{BD} = \{M\}$ If CD = 2 cm. ,

MC = 2.5 cm. and MD = 1.8 cm.

Calculate the perimeter of Δ AMB « 6.3 cm. »



.....

.....

.....

.....

.....

.....

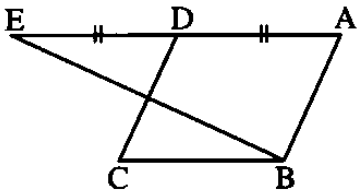
.....

3. **In the opposite figure :**

ABCD is a parallelogram,

$E \in \overrightarrow{AD}$ in which : AD = DE

Prove that : $\overline{DC}$ and $\overline{BE}$ bisect each other.



.....

.....

.....

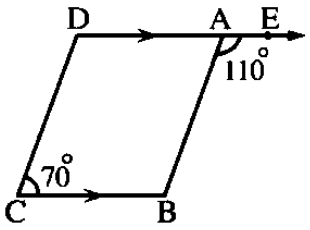
.....

.....

.....

.....

4. **In the opposite figure :**



ABCD is a quadrilateral in which :

$\overline{AD} \parallel \overline{BC}$, $E \in \overrightarrow{DA}$, $m(\angle BAE) = 110°$

and $m(\angle DCB) = 70°$

Prove that : ABCD is a parallelogram

.....

.....

.....

.....

.....

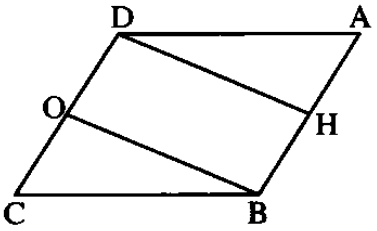
.....

.....

.....

.....

5. **In the opposite figure :**



ABCD is a parallelogram ,

H is the midpoint of $\overline{AB}$

and O is the midpoint of $\overline{DC}$

Prove that : HBOD is a parallelogram.

.....

.....

.....

.....

.....

.....

.....

.....

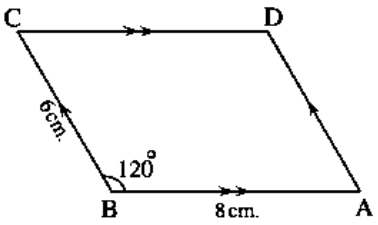
.....

Homework

6. **In the opposite figure :**

ABCD is a parallelogram in which :

AB = 8 cm. , BC = 6 cm. and m (∠ B) = 120°



Find : 1 The length of each of $\overline{CD}$ and $\overline{DA}$

2 The measure of each of ∠ D , ∠ A and ∠ C

3 The perimeter of ABCD

.....

.....

.....

.....

.....

.....

.....

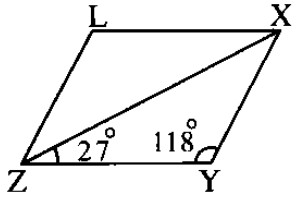
.....

.....

7. **In the opposite figure :**

XYZL is a parallelogram in which :

m (∠ Y) = 118° , m (∠ XZY) = 27°



Find :

(1) m (∠ YXZ) | (2) m (∠ LZX)

(3) m (∠ LXZ) | (4) m (∠ L)

« 35° , 35° , 27° , 118° »

.....

.....

.....

.....

.....

.....

.....

.....

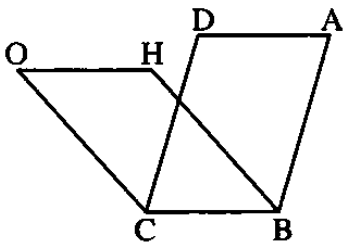
.....

8. **In the opposite figure :**

Each of ABCD

and HBCO is a parallelogram

Prove that : AD = HO



.....

.....

.....

.....

.....

.....

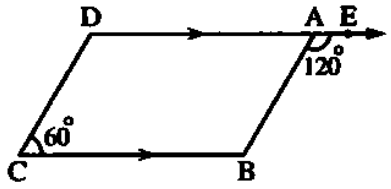
.....

9. **In the opposite figure :**

$E \in \overrightarrow{DA}$, m (∠ EAB) = 120°

m (∠ C) = 60° , $\overrightarrow{DA} \parallel \overline{CB}$

Prove that : ABCD is a parallelogram.



.....

.....

.....

.....

.....

.....

.....

10. **In the opposite figure :**

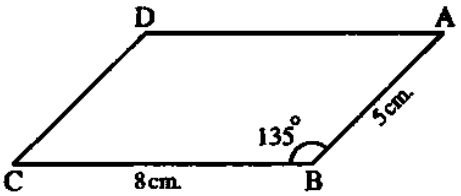
ABCD is a parallelogram in which

AB = 5 cm. , BC = 8 cm. , m (∠ B) = 135°

Find :

(1) m (∠ C)

(2) The perimeter of parallelogram ABCD



.....

.....

.....

.....

.....

.....

.....

Lesson (4)
The special cases of the parallelogram

Notice that :

To prove that the quadrilateral is a rectangle , a rhombus or a square , we must first prove that it is a parallelogram , as we see in the previous lesson , then :

The parallelogram is

a rectangle

if :

One of its angles is a right angle

or

Its two diagonals are equal in length.

a rhombus

if :

Two adjacent sides are equal in length.

or

Its two diagonals are perpendicular.

a square

if :

One of its angles is right and two adjacent sides are equal in length.

or

One of its angles is right and its two diagonals are perpendicular.

or

Its two diagonals are perpendicular and equal in length.

or

Two adjacent sides are equal in length and its two diagonals are equal in length.

Complete each of the following :

1.	A parallelogram whose two diagonals are perpendicular is called .....
2.	The parallelogram whose two diagonals are ..... is called a rectangle.
3.	The parallelogram whose two diagonals are equal in length and perpendicular is called .....
4.	The quadrilateral whose sides are equal in length is called .....
5.	The quadrilateral whose diagonals bisect each other is called .....
6.	The rectangle is a ..... with a right angle.

7. The rhombus is a ..... in which its diagonals are perpendicular.

8. The square is a ..... with a right angle.

9. The rhombus whose two diagonals are equal in length is called .....

10. The rectangle in which its two diagonals are perpendicular is called .....

11. The rectangle in which its two adjacent sides have the same length is called .....

12. If $\overline{XY} \parallel \overline{ZL}$, XY = ZL, then the quadrilateral XYZL is called .....

13. If ABCD is a rhombus, then ..... $\perp$ .....

14. The perimeter of the square = ... ,

The perimeter of the rectangle = ... and

The perimeter of the rhombus = ...

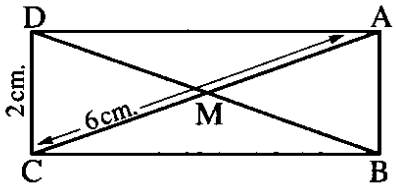
15. The rhombus whose perimeter is 42 cm., its side length = ... cm.

16. **In the opposite figure :**

ABCD is a rectangle in which :

AC = 6 cm. , CD = 2 cm.

and $\overline{AC} \cap \overline{BD} = \{M\}$



Complete : (1) AB = ... cm.

(2) DM = ... cm.

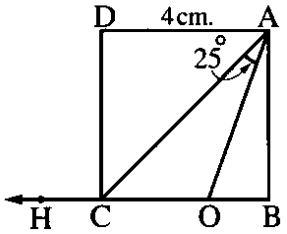
(3) The perimeter of Δ ABM = ... cm.

17. **In the opposite figure :**

ABCD is a square in which AD = 4 cm. ,

$O \in \overline{BC}$ such that : m ($\angle$ OAC) = 25°

and $H \in \overrightarrow{BC}$



Complete the following :

(1) The perimeter of the square = ... cm.

(2) m ($\angle$ ACH) = ...°

(3) m ($\angle$ AOC) = ...°

Choose the correct answer :

1. The two diagonals of a rectangle .....

(a) are perpendicular. (b) are equal in length.

(c) are perpendicular and equal in length. (d) bisect its interior angles.

2. The two diagonals of a rhombus are .....

(a) perpendicular and are not equal.

(b) equal in length and are not perpendicular.

(c) perpendicular and equal in length.

(d) not equal in length and are not perpendicular.

3. The two diagonals of the square , are .....

(a) just perpendicular.

(b) just equal in length.

(c) perpendicular and equal in length.

(d) not equal in length and are not perpendicular.

4. If two adjacent sides are equal in length in a parallelogram, then the figure is a .....

(a) square. (b) rhombus. (c) rectangle. (d) trapezium.

5. If : ABCD is a rectangle in which AC = 5 cm., then : BD = ... cm.

(a) 2.5 (b) 5 (c) 10 (d) 20

6. If : ABCD is a square, then : m (∠ CAB) = ...

(a) 90° (b) 45° (c) 60° (d) 30°

7. If : ABCD is a parallelogram in which m (∠ A) = m (∠ B), then : ABCD is a .....

(a) rectangle. (b) rhombus. (c) square. (d) trapezium.

8. If : ABCD is a rhombus in which m (∠ ACB) = 32°, then : m (∠ D) = ...

(a) 32° (b) 64° (c) 116° (d) 26°

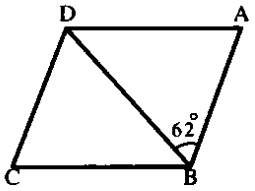
Essay problems:

1. 📖 **In the opposite figure :**

ABCD is a rhombus,

$\overline{BD}$ is a diagonal in it ,

m (∠ ABD) = 62°



Find with proof : m (∠ A)

« 56° »

.....

.....

.....

.....

.....

.....

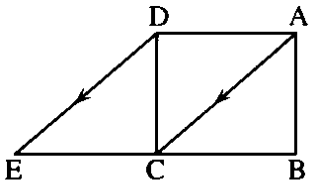
.....

.....

.....

2. 📖 **In the opposite figure :**

ABCD is a square, $E \in \overrightarrow{BC}$, $\overline{AC} // \overline{DE}$



Prove that : ACED is a parallelogram.

Find : m (∠ ACE)

« 135° »

.....

.....

.....

.....

.....

.....

.....

.....

.....

Lesson (5)
The Triangle

Theorem (1) :

The sum of the measures of the interior angles of a triangle is 180°

The measure of the exterior angle of a triangle :

The measure of the exterior angle of a triangle is equal to the sum of the measures of its non adjacent interior angles.

Notice that :

The measure of the exterior angle of a triangle is greater than the measure of any interior angle of the triangle except its adjacent angle.

Remark (1)

If two angles of one triangle equal two angles of another triangle in measure , then the third angle of the first triangle is equal in measure to the third angle of the other triangle.

Remark (2)

- If the sum of measures of two angles in a triangle equals 90° , then the third angle is right.
- If the sum of measures of two angles in a triangle is less than 90° , then the third angle is obtuse.
- If the sum of measures of two angles in a triangle is more than 90° , then the third angle is acute.

Remark (3)

If the measure of an angle in a triangle equals the sum of measures of the other two angles , then the triangle is right-angled.

Complete each of the following :

1. The sum of measures of the inteior angles of a triangle = ... °
2. The measure of the exterior angle of a triangle is equal to the sum of .....
3. If the measure of an angle in a triangle equals the sum of measures of the other two angles in the triangle , then the triangle is .....
4. In Δ ABC : If m (∠ A) + m (∠ C) = m (∠ B) , then m (∠ B) = ... °

5. If the measure of an angle in a triangle is greater than the sum of measures of the other two angles , then the triangle is .....

6. In Δ ABC : If m (∠ B) > m (∠ A) + m (∠ C) , then ∠ B is .....

7. It is possible to find a triangle each of its interior angles is of measure ..... °

Choose the correct answer :

1. The triangle contains two ..... angles at least.

(a) acute (b) obtuse (c) right (d) reflex

2. The sum of measures of the interior angles of a triangle equals the measure of ..... angle.

(a) a right (b) a straight (c) an acute (d) a reflex

3. In Δ XYZ, if : m (∠ X) = 50° , m (∠ Y) = 100°, then : m (∠ Z) = ...

(a) 30° (b) 50° (c) 80° (d) 100°

4. In Δ ABC, if : m (∠ A) + m (∠ B) = 110°, then : m (∠ C) = ...

(a) 110° (b) 90° (c) 70° (d) 55°

5. If the measures of two angles in a triangle are 35° and 45°, then the triangle is .....

(a) acute-angled (b) right-angled (c) obtuse-angled (d) equilateral

6. The measure of the exterior angle of the equilateral triangle at any one of its vertices equals .....

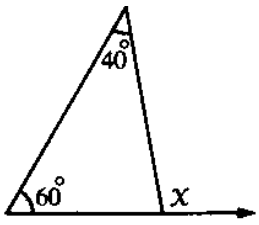
(a) 60° (b) 120° (c) 150° (d) 30°

7. **In the opposite figure :**

x = ...

(a) 60 – 40 (b) 60 × 40

(c) 60 + 40 (d) (60 ÷ 40)



8. ABC is a triangle, m (∠ A) = $2x°$, m (∠ C) = $x°$ and m (∠ B) = $3x°$, then ∠ B is .....

(a) acute. (b) right. (c) obtuse. (d) straight.

Essay problems:

1. **In each of the following figures , find the measure of the angle marked by (?) :**

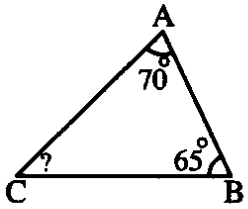


fig. (1)

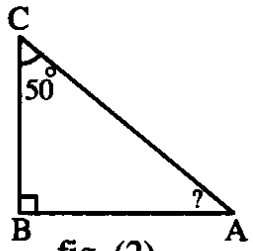


fig. (2)

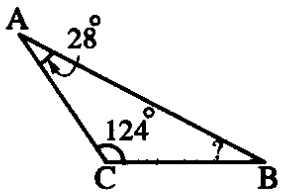


fig. (3)

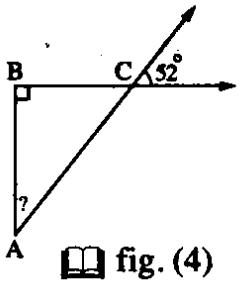


fig. (4)

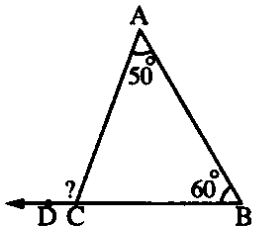


fig. (5)

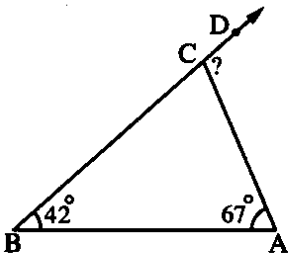


fig. (6)

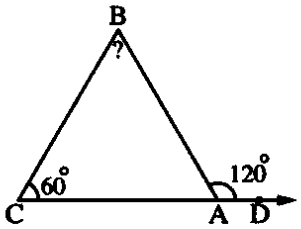


fig. (7)

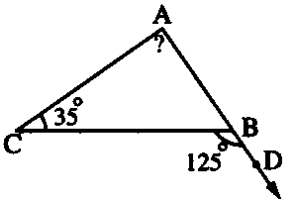


fig. (8)

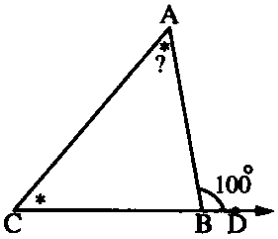


fig. (9)

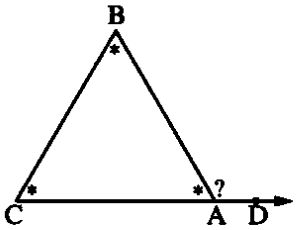


fig. (10)

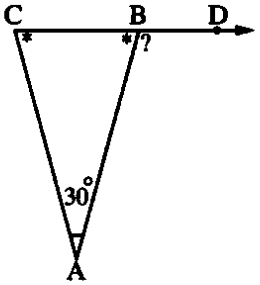


fig. (11)

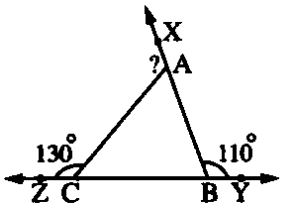


fig. (12)

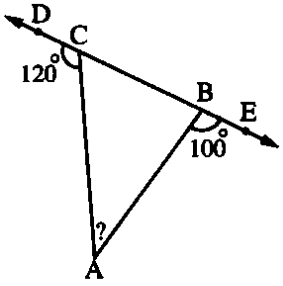


fig. (13)

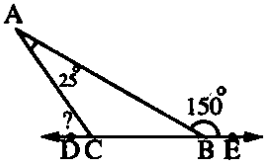


fig. (14)

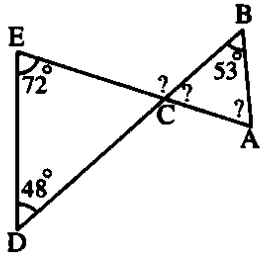


fig. (15)

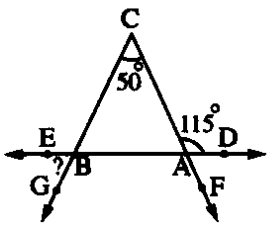


fig. (16)

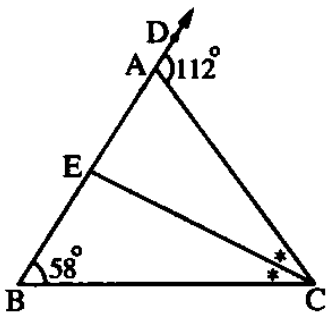
2. **In the opposite figure :**

ABC is a triangle in which : m (∠ B) = 58° ,

$E \in \overline{AB}$ such that $\overrightarrow{CE}$ bisects ∠ ACB ,

$D \in \overrightarrow{BA}$ and m (∠ CAD) = 112°

Find : m (∠ AEC)



.....

.....

.....

.....

.....

.....

.....

.....

.....

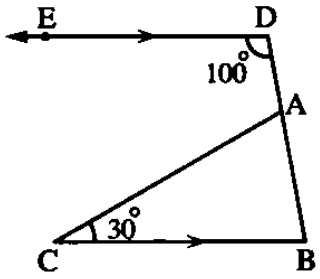
3. **In the opposite figure :**

$\overrightarrow{DE} // \overrightarrow{BC}$, m (∠ D) = 100° ,

m (∠ C) = 30° and

$A \in \overline{DB}$

Find : m (∠ BAC)



.....

.....

.....

.....

.....

.....

.....

.....

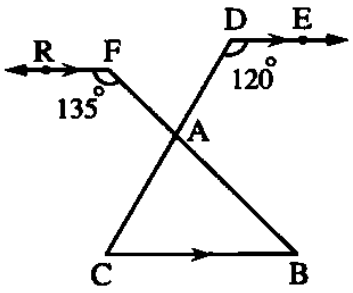
.....

4. **In the opposite figure :**

$\overrightarrow{DE} // \overrightarrow{FR} // \overline{BC}$,

m (∠ CDE) = 120° and m (∠ RFB) = 135°

Calculate the measures of the angles of Δ ABC



.....

.....

.....

.....

.....

.....

.....

.....

.....

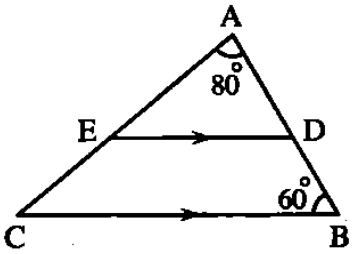
5. **In the opposite figure :**

ABC is a triangle in which : m (∠ A) = 80° and

m (∠ B) = 60°

$\overline{DE} // \overline{BC}$ where : $D \in \overline{AB}$ and $E \in \overline{AC}$

Find : m (∠ AED) and m (∠ DEC)



.....

.....

.....

.....

.....

.....

.....

.....

.....

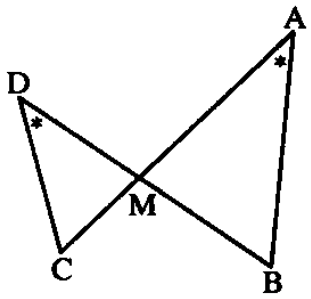
.....

6. **In the opposite figure :**

$\overline{AC} \cap \overline{BD} = \{M\}$ and

$m(\angle A) = m(\angle D)$

Prove that : $m(\angle B) = m(\angle C)$



.....

.....

.....

.....

.....

.....

.....

.....

.....

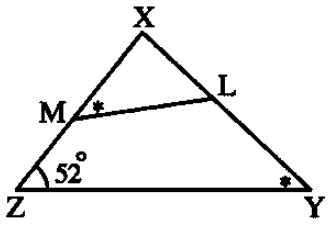
7. **In the opposite figure :**

XYZ is a triangle in which $m(\angle Z) = 52°$,

$L \in \overline{XY}$ and $M \in \overline{XZ}$ such that :

$m(\angle Y) = m(\angle XML)$

Find : $m(\angle XLM)$



.....

.....

.....

.....

.....

.....

.....

.....

.....

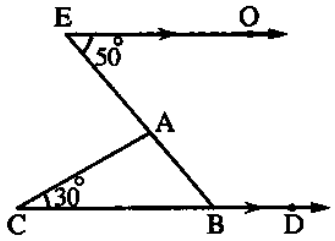
8. **In the opposite figure :**

$\overrightarrow{EO} // \overrightarrow{CD}$, m (∠ E) = 50°

, m (∠ C) = 30° ,

Find the measures of

angles of Δ ABC , m (∠ ABD)



.....

.....

.....

.....

.....

.....

.....

.....

.....

Homework

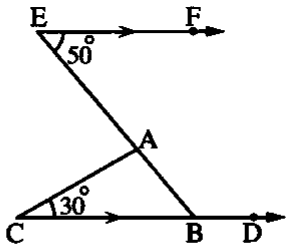
1 **In the opposite figure :**

$\overrightarrow{EF} // \overrightarrow{CD}$, m (∠ E) = 50° and

m (∠ C) = 30°

Find the measures of the angles

of Δ ABC and m (∠ ABD)



« m (∠ ABC) = 50° , m (∠ BAC) = 100° , m (∠ ABD) = 130° »

.....

.....

.....

.....

.....

.....

.....

.....

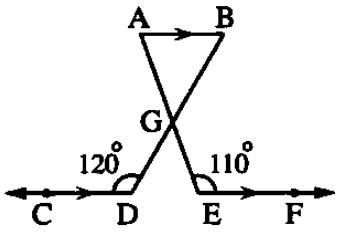
.....

2. **In the opposite figure :**

$\overrightarrow{AB} // \overrightarrow{DC} // \overrightarrow{EF}$, m (∠ E) = 110° and

m (∠ D) = 120°

Find : m (∠ EGD)



.....

.....

.....

.....

.....

.....

.....

.....

.....

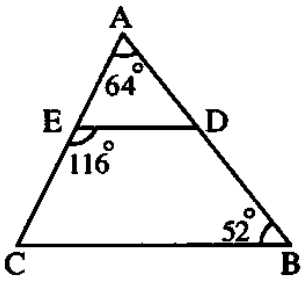
3. **In the opposite figure :**

ABC is a triangle in which m (∠ A) = 64° ,

m (∠ B) = 52° ,

m (∠ DEC) = 116° , $E \in \overline{AC}$ and $D \in \overline{AB}$

Prove that : $\overline{DE} // \overline{BC}$



.....

.....

.....

.....

.....

.....

.....

.....

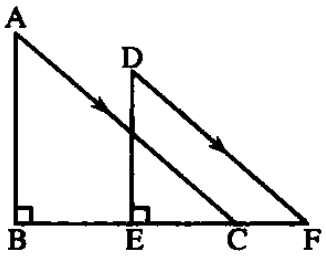
.....

4. **In the opposite figure :**

The points F , C , E and B are collinear ,

$m(\angle B) = m(\angle DEC) = 90°$ and $\overline{AC} \parallel \overline{DF}$

Prove that : $m(\angle A) = m(\angle D)$



.....

.....

.....

.....

.....

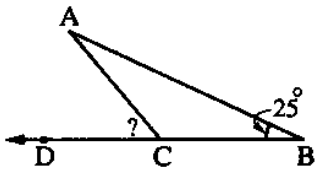
.....

.....

5. **In the opposite figure :**

$m(\angle A) = m(\angle B) = 25°$

Find : $m(\angle ACD)$



.....

.....

.....

.....

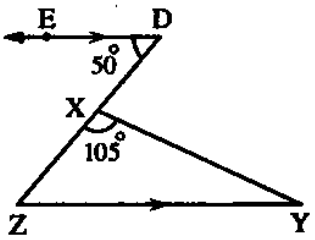
.....

6. **In the opposite figure :**

$\overrightarrow{DE} \parallel \overline{YZ}$, $m(\angle ZDE) = 50°$

, $m(\angle YXZ) = 105°$

Find : $m(\angle Z)$, $m(\angle Y)$, $m(\angle YXD)$



.....

.....

.....

.....

.....

.....

.....